Coho Colonization Potential of the Cowichan-Koksilah Watershed: A Habitat Evaluation

T. Burns and B.D. Tutty

Habitat Management Operations
Department of Fisheries and Oceans
South Coast Division
3225 Stephenson Point Road
Nanaimo, B.C. V9T 1K3

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Glossary of Terms*

- Compaction - relative density of bed material, usually caused by sedimentation.
- Debris - organic material deposited within the channel; in this case branches, roots, chunks and logs.
- Float measurement - a method of discharge estimation where rate is computed on the basis of the length of time a float takes to pass over a measured stream section.
- Glide - a relatively smooth section of flowing water.
- Habitat area - the wetted area of a stream less than 5% slope (gradient); determined by multiplying length by average reach width and summing reach totals.
- Pool - a deep, relatively low velocity stream segment.
- Reach - zone of relatively homogenous properties; slope and bed materials (substrate) are definitive features.
- Riffle - a shallow area of stream where surface water is broken into waves and turbulence by bed material.
- Run - a deep section of fast flowing water with an unbroken surface.
- Slough - a low or nil velocity stream section generally of uniform depth and fine substrate; glides and riffles are absent.
- Streamflow duration - permanent (perennial) surface flow present all year.
  - intermittent (discontinuous): surface water isolated by dry areas during drought period.
  - temporary (ephemeral): wetted only during runoff.

  NOTE: some streams have sections of all three types.
- Turbidity - a measure of the maximum vertical depth of visibility in water.

* Chamberlin, 1980. Aquatic Survey Terminology.

ABSTRACT

Burns, T. and B.D. Tutty, 1986. Coho Colonization Potential of the Cowichan-Koksilah Watershed: A Habitat Evaluation. Can. Ms. Rep. Fish. Aquat. Sci. # 1865: iv + 65.

Reaches of the Cowichan-Koksilah system situated above barriers were assessed for their suitability as coho rearing habitat in the arid late summer of 1985. Discharge and temperature were recorded, along with structural characteristics of specified stream sections. An estimate of 6,383,900 M^2 of viable habitat was identified with a potential smolt yield of approximately 500,000 or 2.5 million based on two different production models. Dollar value at harvest is annually estimated near $1 million and $5 million (1984) respectively, depending on the production model employed. More conservative or liberal production assumptions can be applied to the habitat data contained in the report. Development of cost models and possible strategies would be part of a Cowichan-Koksilah watershed production plan that would embrace a balanced multistock rebuilding/enhancement effort in cooperation with the Provincial Fisheries Branch.

RESUMÉ

Les auteurs ont, au cours de la fin d'été très sèche de 1985, évalué des sections du réseau Cowichan-Koksilah situées en amont de barrières afin d'en déterminer le potentiel des habitats pour la croissance du saumon coho. Le débit et la température de l'eau, de même que des caractéristiques de certaines sections de cours d'eau, on été relevés. La superficie de l'habitat convenable a été estimée à 6 383 900 m^2, ce qui représente, tout dépendant du modèle utilisé, une production de smolts pouvant atteindre 500 000 ou 2,5 millions de poissons pour une valeur respective de un ou de cinq millions de dollars (1984). Des hypothèses de production plus ou moins conservatrices peuvent être appliquées aux données du rapport. L'élaboration de modèles de coûts et de stratégies ferait partie d'un plan de production pour le bassin Cowichan-Koksilah qui comprendrait des travaux intégrés ou restauration et de mise en valeur de plusieurs stocks effectués en collaboration avec la Direction des pêches de la province.

1.0 INTRODUCTION

This report provides a listing of coho colonization options ranked by estimated output in segments of the Cowichan/Koksilah watershed situated above impassable barriers. The field project was undertaken during August and September, 1985, by the South Coast Division Field Services Branch of the Department of Fisheries and Oceans to establish the extent of coho colonization options. This work may become part of a salmonid management plan for the Cowichan-Koksilah watershed.

2.0 METHODS

A preliminary coho overview (Level I) of the Cowichan-Koksilah watershed was completed in 1984 employing methods described in Chamberlin et al, 1984, Salmonid Habitat Information Project: A Strategic Level Inventory Approach. This summary indicated 260 km of stream channel with less than 5% channel gradient and accessible to coho, and 232 km of channel and 8.75 sq. km of lake and wetlands habitat with the potential to produce coho but inaccessible to them.

This report documents a (Level II) reconnaissance assessment undertaken to verify the inaccessible potential and to identify and rank possible coho rearing areas in the watershed. Stream structure was recorded on 1:50,000 N.T.S. maps utilizing a system described by Shera (1985). Stream discharge, temperature, channel width, wetted width, gradient, substrate character and wetted area were estimated for each reach and are described in Appendix A.

The Habitat data forms in Appendix A describe the character of representative sections of the reaches in a subbasin. Reaches (Chamberlin, 1980) are delineated from air photos and defined on maps prior to field survey. Habitable area per reach is determined by multiplying reach length by mean wetted width. Habitable area for coho is considered to be wetted area less than 5 per cent gradient. Wetland areas are included in the stream reaches where they occur.

Chronic low summer flows have been described by Neave, (1949) and more recently by Tutty (1984) in The Koksilah River: Streamflows and Salmon Production. Summer rearing habitat is believed to limit coho production in the Cowichan-Koksilah watershed.

Two coho production models were employed to estimate coho production potential. The more conservative Model A assumes one coho fry/m^2 rearing density for low gradient (less than 2%) channels, lakes, and wetlands and .5 fry/m^2 for channel habitat of 2.1% - 5% gradient. Model B assumes a carrying capacity of 40 smolts/100m^2 used in S.E.P. design standards, DFO (1983). Criteria of 8% fry/smolt and 15% smolt/adult survivals are employed, D.F.O. (1981). More conservative or liberal production assumptions can be applied to the habitat data contained in this report.

3.0 RESULTS

Of the potential habitat identified in the 1984 (Level 1) assessment, (232 km channel, 8.75 sq km of lake and wetland), the 1985 survey indicated that 66% (154 km.) of channel and 67% (5.86 sq km) of the lake and wetland habitat were viable. In terms of wetted area, 6,383,900 m^2 of habitat would produce a smolt yield of 499,684 (Model A) and 2,546,400 smolts by Model B requiring up to 6,236,100 coho fry to seed it (Table 1).

Monetary values were calculated based on the following assumptions: (1) an exploitation rate of 80%, (2) 70% of this harvest allocated to the commercial sectors and 30% to sport harvest, and (3) commercially caught coho are valued at $6.54 ($1984) each and sport catch is valued at $45 each. A value estimation D.F.O. (1985) of the coho colonization potential of the Cowichan-Koksilah River employing the two production models is presented in Table 2. An estimated annual benefit of between $1 and $5 million may result from successful coho colonization programs. Cost models are not available.

Development of cost models and possible strategies should be part of a Cowichan-Koksilah watershed production plan that would embrace a balanced multistock rebuilding/enhancement effort. Colonization of salmonids or transfer of fish between watersheds is strictly regulated by the Department of Fisheries & Oceans.

TABLE 1: **Potential Coho Habitat Above Barriers in the Cowichan River System Ranked by Estimated Production (Model A)**

A	B	C	D	E	F	G
Unit	Stream Code Number	Local Name	Estimated m^2 of Habitat Area	Coho Fry Required to Seed Habitat*	Model A* Estimated Smolt Yield	Model B* Estimated Smolt Yield
1	92-4800-055	Quamichan Lake	3,100,000*	3,100,000	248,000	1,240,000
2	92-4800-020	Upper Koksilah (Reach 5) (without - 53,000 m^2) with Impoundment	800,000*	800,000	64,000	320,000
3	92-4800-020-500	Grant Lake	540,000*	540,000	43,200	216,000
4	92-4800-190	Lois Lake	250,000*	250,000	20,000	100,000
5	92-4800-060-900	Crofton Res.	240,000*	240,000	19,200	96,000
6	92-4800-400	Upper Bear Cr. (R5)	220,000*	220,000	17,600	88,000
7	92-4800-020-110	Dougan Lake	120,000*	120,000	9,600	48,000
8	92-4800-950-500	Gillespie Lake	120,000*	120,000	9,600	48,000
9	92-4800-950-100	Shaw Lake	100,000*	100,000	8,000	40,000
10	92-4800-020-425	Wild Deer Lake	90,000*	90,000	7,200	36,000
11	92-4800-490	Grant, Kwassin and Lost Lakes	90,000*	90,000	7,200	36,000
12	92-4800-190	Tadjiss L. with Impoundment (without 50,000)	70,000*	70,000	5,600	28,000
13	92-4800-020-700-200	McPherson Lake with Impoundment (without 30,000)	60,000*	60,000	4,800	24,000
14	92-4800-950-350	West Shaw (R1)	40,000*	40,000	3,200	16,000
15	92-4800-350	Mayo Pond	35,000*	35,000	2,800	14,000
		SUBTOTAL	5,875,000	5,875,000	470,000	2,350,000

* **Coho Biostandards**

Model A

* 1 fry per m^2 of channel 2% gradient or less and for lakes and wetlands @ 8% fry to smolt survival.

\+ .5 fry per m^2 of channel 2.1-5% gradient @8% fry to smolt survival.

Model B

40 smolts per $100m^2$ of wetted coho habitat. (S.E.P. Biostandards, 1981).

TABLE 1 (continued)

A	B	C	D	E	F	G
Unit	Stream Code Number	Local Name	Estimated m^2 of Habitat Area	Coho Fry Required to Seed Habitat*	Model A* Estimated Smolt Yield	Model B* Estimated Smolt Yield
16	92-4800-950	Shaw (Main Stem)	22,500*	22,500	1,800	9,000
17	92-4800-190	Holt Creek (R4)	21,000*	21,000	1,680	8,400
18	92-4800-650	Meade Creek	37,500+	18,700	1,500	15,000
19	92-4800-875	McKay Creek	35,000+	17,500	1,400	14,000
20	92-4800-950-110	Middle Shaw	35,000+	17,500	1,400	14,000
21	92-4800-750	Cottonwood Creek	34,000+	17,000	1,360	13,600
22	92-4800-020-700	Fellows Creek	16,000*	16,000	1,280	6,400
23	92-4800-585	Upper Robertson	30,000+	15,000	1,200	6,000
24	92-4800-190	Holt (R2)	15,000*	15,000	1,200	6,000
25	92-4800-020-050	Kelvin Creek	15,000*	15,000	1,200	6,000
26	92-4800-125	Inwood Creek	15,000*	15,000	1,200	6,000
27	92-4800-020	Lake tributary to Upper Koksilah (R5)	12,500*	12,500	1,000	5,000
28	92-4800-020-425	Wild Deer (R2)	12,000*	9,600	960	4,800
29	92-4800-950-350	Upper West Shaw (R2)	20,000+	10,000	800	8,000
30	92-4800-400	Bear (R2) Creek	9,000*	9,000	720	3,600
31	92-4800-020-700-200	McPherson	8,500*	8,500	680	3,400
		SUBTOTAL	338,000	239,800	19,980	129,200

* **Coho Biostandards**

Model A

* 1 fry per m^2 of channel 2% gradient or less and for lakes and wetlands @ 8% fry to smolt survival.

\+ .5 fry per m^2 of channel 2.1-5% gradient @ 8% fry to smolt survival.

Model B

40 smolts per $100m^2$ of wetted coho habitat. (S.E.P. Biostandards, 1981).

TABLE 1 (continued)

A	B	C	D	E	F	G
Unit	Stream Code Number	Local Name	Estimated m^2 of Habitat Area	Coho Fry Required to Seed Habitat*	Model A* Estimated Smolt Yield	Model B* Estimated Smolt Yield
32	92-4800-585-400	East Robertson (R3)	8,000+	8,000	640	3,200
33	92-4800-060-650	Bings Creek (R4)	7,500*	7,500	600	3,000
34	92-4800-020	Upper Koksilah (R4)	14,000+	7,000	560	5,600
35	92-4800-400	Bear (R3)	12,500+	6,250	500	5,000
36	92-4800-	Old Truck (R2)	6,000	6,000	480	2,400
37	92-4800-950-500	Bings (Menzies)	5,000*	5,000	400	2,000
38	92-4800-950-500	East Shaw (R1)	10,000+	5,000	400	4,000
39	92-4800-060-900	Richards (R2)	5,000*	5,000	400	2,000
40	92-4800-020-650-150	West Koksilah Br. 2	5,000*	5,000	400	2,000
41	92-4800-	McPherson (R2)	5,000*	5,000	400	2,000
42	92-4800-020-700	Fellows (R1)	10,000*	5,000	400	4,000
43	92-4800-020-670	South Koksilah	5,000*	5,000	400	2,000
44	92-4800-585	Swampwater Creek (R2)	4,500*	4,500	360	1,800
45	92-4800-	Upper E. Robertson (R5+7)	8,600+	4,300	344	3,440
46	92-4800-650-500	Meade Tributary 3	4,000*	4,000	320	1,600
47	92-4800-	Dale's Creek (R3)	3,900*	3,900	312	1,560
48	92-4800-020-575	Kapoor (R2)	7,000+	3,500	280	2,800
49	92-4800-750-250	Widow (R1)	6,000+	3,000	240	2,400
50	92-4800-	Ashburnham (R5)	5,600+	2,800	224	1,120
		SUBTOTAL	132,600	95,750	7,660	51,920

Model A

* 1 fry per m^2 of channel 2% gradient or less and for lakes and wetlands @ 8% fry to smolt survival.
+ .5 fry per m^2 of channel 2.1-5% gradient @ 8% fry to smolt survival.

Model B

40 smolts per $100m^2$ of wetted coho habitat (S.E.P. Biostandards, 1981).

TABLE 1 (continued)

A	B	C	D	E	F	G
Unit	Stream Code Number	Local Name	Estimated m^2 of Habitat Area	Coho Fry Required to Seed Habitat*	Model A* Estimated Smolt Yield	Model B* Estimated Smolt Yield
51	92-4800-510	Oliver Creek (Hatchery)	3,000*	3,000	240	1,200
52	92-4800-020-110	Petrolas Creek (R3)	3,000*	3,000	240	1,200
53	92-4800-020-150	West Koksilah (Mainstem R1)	4,500+	2,250	180	1,800
54	92-4800-055	Quamichan Creek (R2)	2,250*	2,250	180	900
55	92-4800-900	Upper Nixon	4,000+	2,000	160	1,600
56	92-4800-900	Nixon W. Tributary	4,000+	2,000	160	1,600
57	92-4800-605	South Sutton (west fork)	3,000+	1,500	120	1,200
58	92-4800-605	Five Culverts	2,500+	1,250	100	1,000
59	92-4800-	Beadnell	1,500*	1,500	120	600
60	92-4800-060-650	Bings East	1,250*	1,250	100	500
61	92-4800-960	Little Shaw Creek	2,000+	1,000	80	800
62	92-4800-020-425	Wild Deer Creek (R1)	2,000+	1,000	80	800
63	92-4800-900	Nixon east tributary	2,000+	1,000	80	800
64	92-4800-390	Skutz Creek (West)	1,000*	1,000	80	400
65	92-4800-390	Skutz Creek (east)	800*	800	64	320
66	92-4800-020-670-150	W. Koksilah Br. 1	1,500+	750	60	600
		SUBTOTAL	38,300	25,550	2,044	15,320
		GRAND TOTAL	6,383,900 m^2	6,236,100 coho fry	499,684 coho smolts	2,546,440 coho smolts

* **Coho Biostandards**

Model A

* 1 fry per m^2 of channel 2% gradient or less and for lakes and wetlands @ 8% fry to smolt survival.
+ .5 fry per m^2 of channel 2.1-5% gradient @ 8% fry to smolt survival.

Model B

40 smolts per $100m^2$ of wetted coho habitat (S.E.P. Biostandards, 1981).

TABLE 2 - A Valuation Range of the Coho Colonization Potential of the Cowichan - Koksilah Watershed employing two production models.

	Model A*	Model B*
Total Habitat Area inaccessible to Coho	6,383,900 m^2	6,383,900 m^2
Total Coho Fry Required to Seed Habitat	6,236,100 fry	6,236,100 fry
Total Coho Smolts Produced	499,684 smolts	2,546,400 smolts
Total Adult Coho Produced (15%)	74,952 coho	381,960 coho
Total Catch (80% Harvest Rate)	59,961 coho	305,568 coho
Canadian Commercial Catch (55%)	(32,978)	(168,062)
American Commercial Catch (15%)	(8,994)	(45,835)
Canadian Sport Catch (30%)	(17,988)	91,670)
Escapement (20%)	11,992	76,392
Net Wholesale Value of Canadian Commercial Catch Catch @ $6.54/piece ($1984)	$215,676	$1,099,125
Net Wholesale Value of American Commerical Catch Catch @ $6.54/piece ($1984)	$ 58,820	$299,760
Value of Canadian Sport Catch @$45/piece ($1984)	$809,460	$4,125,150
Potential Value of Annual Harvest From Coho Colonization	$1,083,956	$5,524,035

*Coho Biostandards

Model A

* 1 fry per m^2 of channel 2% gradient or less and for lakes and wetlands @ 8% fry to smolt survival.

+ .5 fry per m^2 of channel 2.1-5.0% gradient @ 8% fry to smolt survival.

Model B

40 smolts/100m^2 of wetted coho habitat (S.E.P. Biostandards, 1981).

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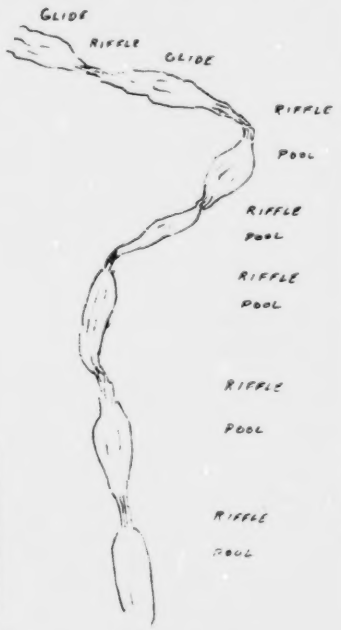
APPENDIX A

Individual Reach Assessments of Above Barrier Habitats

HABITAT FORM COWICHAN Co COLONIZATION

UNIT 1

HABITAT SECTION PLAN VIEW upstream



HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY
Ave Channel Width 3.5 M
Ave Wetted Width 1.5 M
Ave Slope 1 %
Length 1500 m downstream
Habitable area 2250 M2

System Name Quamichan Lake Reach No. 2
No. 92-4900-055 Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location 200 m above falls via path from Trans-Canada Rd.
85 | 9 | 5 (yr mo day) Time 1200 Agency ___ Crew TB /
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Cloudy; mild Air Temp. °C 19
Access Trans-Canada Rd Water Temp. °C 14 (stream) / 18 (lake)

SECTION SUMMARY

Avg. Chan. Width (m)	3.5	Total Pool (%)	46
Avg. Wetted Width (m)	1.5	Total Riffle (%)	31
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	150	Total Glide (%)	23
Avg. Slope (%)	1	Total Slough (%)	
Debris (%)	1	Turbidity (cm)	

Side Channel (Nil) L M H Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	20	30	30	10	Tr	
riffle	5	20	30	30	15	Tr	
run							
glide	10	20	30	30	10	Tr	
slough							

D50 (cm) 1 D90 (cm) 8

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 3.5
WETTED WIDTH (M) .1
AVE. DEPTH (CM) 2
WETTED X-SEC. AREA (M^2) .0002
AVE VELOCITY (M/SEC) .03
FLOW (M^3/SEC) 0.000063
0.002 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≈ 22

COMMENTS

QUAMICHAN LAKE

Quamichan Creek is intermittant in terms of Co rearing value although there is usually some flow between pools, it seems too unstable to support Co. (Total habitat: 2250 Pot. smolt yield: 180)

Quamichan Lake cutthroats spawn in the creek and some fry remain over the summer; likely stranded.

Quamichan L. (310 H) is the most outstanding potential Co rearing area in the system. This enriched, eutrophic lake is capable of producing at least 248000 Co smolts.

The lake supports a good early spring sport fishery but very few people participate despite good access and large fish (45 cm plus).

HABITAT FORM COWICHAN Co COLONIZATION

HABITAT SECTION PLAN VIEW

upstream

downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

Avg. chan. width	7 M
Avg. wetted width	5.3 M
Avg. slope	0.5 %
Length	10000 M
Habitable area	53000 M2

System Name Upper Koksilah Reach No.
No. 92-4500-020-730 ? Point No. of
NTS 92 B/12 Card No. of
Site Location Branch M 'xing
85 | 8 | 29 yr mo day Time 1400 Agency Crew TB/
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Partly cloudy; mild Air Temp. °C 19
Access N to U to M Water Temp. °C 11

SECTION SUMMARY

Avg. Chan. Width (m)	7	Total Pool (%)	100 ?
Avg. Wetted Width (m)	6.5	Total Riffle (%)	
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	650	Total Glide (%)	
Avg. Slope (%)	0.2	Total Slough (%)	100 ?
Debris (%)	20	Turbidity (cm)	70 +

Side Channel (Nil) L M H Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	30	20	20	10	20		
riffle							
run							
glide							
slough							

D50 (cm) .5 D90 (cm) 8

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 7
WETTED WIDTH (M) 6.5
AVE. DEPTH (CM) 30
WETTED X-SEC. AREA (M^2) 1.95
AVE VELOCITY (M/SEC) 0
FLOW (M^3/SEC) 0 *

* no movement but entire reach is well wetted. The area is an elongated pond!

COMMENTS Slough ?

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 470

Excellent Co habitat
Trout density: 0
Total available RY habitat : 28000
7500
17500
53000 M2

With impoundment : ≅ 800,000 M2

Smolt yield potential :
as is based on 1 summer fry / M^2 and 8% overwinter survival = 4240
with impoundment = 68000

Flow 2500 m downstream = 0.023 CMS

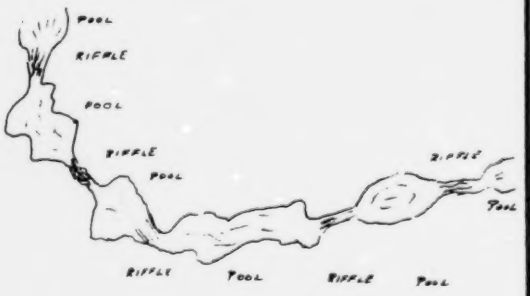
HABITAT FORM

COWICHAN CO COLONIZATION UNITS 3-5 ARE LAKES

6

HABITAT SECTION PLAN VIEW

upstream



HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

Avg. chan width 7M
Avg. wetted width 3M
Avg. slope 1%
Length 2500 M
Habitable area 7500 M²

downstream

System Name Bear Creek Reach No.
No. 92-4800-400 Point No. of
NTS 92 C/9, B/12 Card No. of
Site Location R xing
95 | 9 | 29 yr mo day Time 1200 Agency Crew TB/
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + warm Air Temp. °C 20
Access Mt B R line Water Temp. °C 7

SECTION SUMMARY

Avg. Chan. Width (m)	7	Total Pool (%)	70
Avg. Wetted Width (m)	3	Total Riffle (%)	30
Total Length (m)	60	Total Run (%)	
Total Wetted Area (m²)	180	Total Glide (%)	
Avg. Slope (%)	1	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	1	5	10	30	30	24	
riffle	1	3	10	30	30	26	
run							
glide							
slough							

D50 (cm) 10 D90 (cm) 70

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 7
WETTED WIDTH (M) 3
AVE. DEPTH (CM) 8
WETTED X-SEC. AREA (M^2) .024
AVE VELOCITY (M/SEC) .35
FLOW (M^3/SEC) 0.0084
0.29 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 710

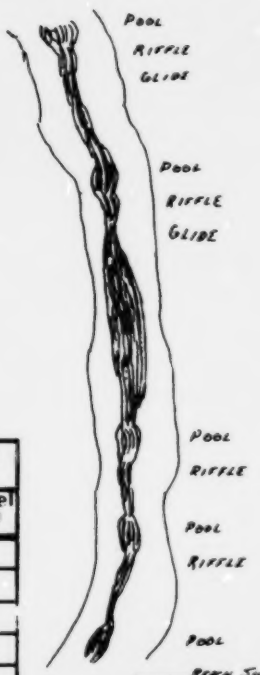
Total habitat : 7300 stream
220,000 lake and wetland including a lake tributary
to R (R4) gradient is too high for habitability)
Pot. small yield
stream 600
lake + wetland (impounded) 17600

HABITAT FORM

COWICHAN Co COLONIZATION
SHAW UNITS 7-13 ME LAKES

HABITAT SECTION PLAN VIEW

upstream



downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY
Av. chan width 14 m
Av. wetted width 8 m
Av. slope 2 %
Length 100 m
Area 800 m²

System Name West Shaw Reach No. 1
No. 92 - 950 - 350 Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location 900 m above junction with N main
85 | 8 | 13 (yr mo day) Time 1400 Agency ___ Crew TB /
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear & warm Air Temp. °C 18
Access path on left off end of old gravel Water Temp. °C 11

SECTION SUMMARY

Avg. Chan. Width (m)	14	Total Pool (%)	23
Avg. Wetted Width (m)	8	Total Riffle (%)	36
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	800	Total Glide (%)	41
Avg. Slope (%)	2	Total Slough (%)	
Debris (%)	1	Turbidity (cm)	60+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul >256 (mm)	Bedr.	C
pool	10	20	20	20	30	Tr	
riffle	2	5	10	40	43		
run							
glide	4	10	20	40	26		
slough							

D50 (cm) 15 D90 (cm) 70

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 14
WETTED WIDTH (M) 6
AVE. DEPTH (CM) 28
WETTED X-SEC. AREA (m^2) 1.68
AVE VELOCITY (M/SEC) .16
FLOW (m^3/SEC) 0.27
9.5 cfs

STREAM CROSS-SECTION (Looking Downstream)

COMMENTS

Rb x Cy density 0.006 / m^2. Reasonable coho habitat.
R1 Co density : 1.5 / m^2 (mainstem below falls)
Available habitat in W Shaw R1 : 40,000 m^2
Possible W Shaw R1 summer carrying capacity for Co fry : 40000
Probable smolt yield at 8 % : 3200
Possible smolt yield by the Marshall - Britton formula : 13396
Actual smolt yield should be somewhere between 8 % and the M-B formula because Co overwinter in Cowichan lake with apparently excellent survival.

HABITAT FORM COWICHAN

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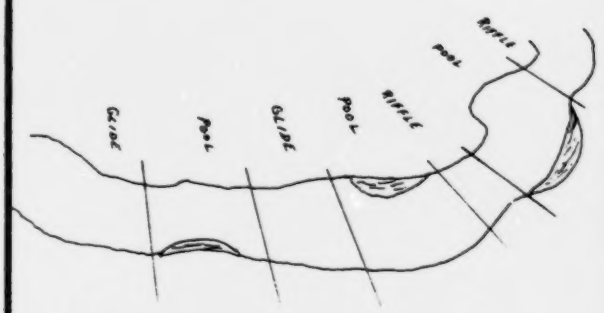
HABITAT SECTION PLAN VIEW upstream



System Name Mayo Cr. Reach No. 2
No. 92 - 350 Point No. of
NTS 92 B/13 Card No. of
Site Location 300 m above W. Riverbottom Rd.
85 | 8 | 2 Time 1300 Agency Crew TB/
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + Warm Air Temp. °C 25
Access W. Riverbottom, skid road Water Temp. °C 15

SECTION SUMMARY

Avg. Chan. Width (m)	10	Total Pool (%)	41
Avg. Wetted Width (m)	0-2	Total Riffle (%)	26
Total Length (m)	200	Total Run (%)	
Total Wetted Area (m²)	26	Total Glide (%)	33
Avg. Slope (%)	2	Total Slough (%)	
Debris (%)	10	Turbidity (cm)	50+

Side Channel Nil L (M) H Compaction Nil (L) M H

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

Ave. chan width 10 M
Ave wetted width 0 M
Ave slope 2 %
Length (to Mayo Pond from Falls) 3500 M
Habitable Area downstream Nil

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	2	20	30	30	18		
riffle	2	5	20	30	43		
run							
glide	2	10	30	30	28		
slough							

D50 (cm) 5 D90 (cm) 30

FLOW SUMMARY

METHOD
CHAN. WIDTH (M) 10
WETTED WIDTH (M) 0-2
AVE. DEPTH (CM) NIL
WETTED X-SEC. AREA (m²) NIL
AVE VELOCITY (M/SEC) NIL
FLOW (m³/SEC) NIL

STREAM CROSS-SECTION (Looking Downstream)

COMMENTS

Structurally, Mayo Creek is superb Co habitat. Unfortunately it withdraws to isolated pools in late summer and early fall.
Optimal rearing flow: 0.15 cms
Large numbers of Ct fry in pools; very few parr.
Mayo Pond is ideal Co habitat but provides superb early spring trout fishing for local youths (Rb and Ct to 35 cm)
Pot smolt yield: 2850 from 35000 M²

HABITAT FORM

COWICHAN Co COLONIZATION SHAW

16

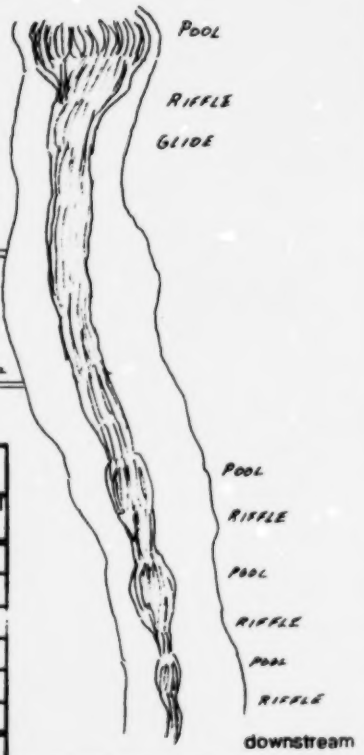
HABITAT SECTION PLAN VIEW

upstream

The SNIP map indicates that Co utilize about 5000 m of Shaw Creek. The actual distance is 3000 m.

REACH SUMMARY

Ave. channel width 21M
Ave. wetted width 9M
Ave. slope 1%
Length 3500 M
Habitat area 22500 M²



downstream

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name SHAW MAINSTEM Reach No. 3
No. 92-4900-950 Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location 2000 m above first falls
85 | 9 | 13 (yr mo day) Time 1280 Agency ___ Crew TB/
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear and warm Air Temp. °C 21
Access Oil gravel + logging road from Shaw Main Water Temp. °C 11

SECTION SUMMARY

Avg. Chan. Width (m)	21	Total Pool (%)	31
Avg. Wetted Width (m)	9	Total Riffle (%)	15
Total Length (m)	100	Total Run (%)	—
Total Wetted Area (m²)	900	Total Glide (%)	54
Avg. Slope (%)	1	Total Slough (%)	—
Debris (%)	0	Turbidity (cm)	97

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	5	10	30	40	10	
riffle	1	15	15	30	39		
run							
glide	5	20	20	20	35		
slough							

D50 (cm) 17 D90 (cm) 60

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 21
WETTED WIDTH (M) 9
AVE. DEPTH (CM) ___
WETTED X-SEC. AREA (M²) ___
AVE VELOCITY (M/SEC) ___
FLOW (M³/SEC) 0.51
18.0 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≈ 180

COMMENTS

This reach is excellent chinook habitat. Good access via old trails at 0.7 and 2.5 Kms above Margaret Creek bridge.

Co density below falls: ≈ 1.5/M² (R1). Rb fry also appear this level for about one week between Aug. 1 and Aug. 15 in reach 1.

R3 habitat: 22500 M²

Pot. smolt yield: 1800

Reach 3 is Shaw mainstem from the first falls 3000 m above Cowichan Lake to the West Fork - Middle Fork confluence.

HABITAT FORM COWICHAN Co Colonization

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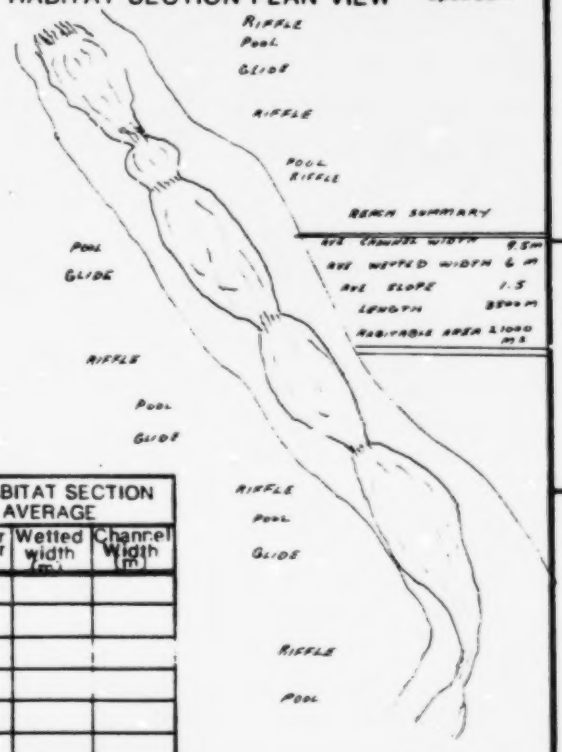
HABITAT SECTION PLAN VIEW

upstream



downstream

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Holt Cr Reach No. 4
No. 92-4800-190 Point No. of
NTS 92 B/13 Card No. of
Site Location N main X109
85 | 9 | 1 | / Time 1200 Agency Crew TBI
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + warm Air Temp. °C 19
Access N main Water Temp. °C 9

SECTION SUMMARY

Avg. Chan. Width (m)	9.5	Total Pool (%)	40
Avg. Wetted Width (m)	6	Total Riffle (%)	16
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	600	Total Glide (%)	44
Avg. Slope (%)	1.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	30+

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	2	20	20	50	8	T	
riffle	1	10	15	30	44	T	
run							
glide	2	20	20	50	8	T	
slough							

D50 (cm) 20 D90 (cm) 80

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 9.5
WETTED WIDTH (M) .7
AVE. DEPTH (CM) 10
WETTED X-SEC. AREA (M^2) .07
AVE VELOCITY (M/SEC) .46
FLOW (M^3/SEC) 0.032
1.13 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≃ 335

COMMENTS

NO trout above the falls and none in Tadjiss or Lois Lakes
Good summer Co habitat
Total available R4 habitat : 21000 M^2
Co density below falls : 1.5/m^2
Potential smolt yield : 1680
Plus Lois Lake : 25 HA - 20000
Plus Tadjiss Lake :
as is - 4000 (5 HA)
with impoundment - 5600 (7 HA)

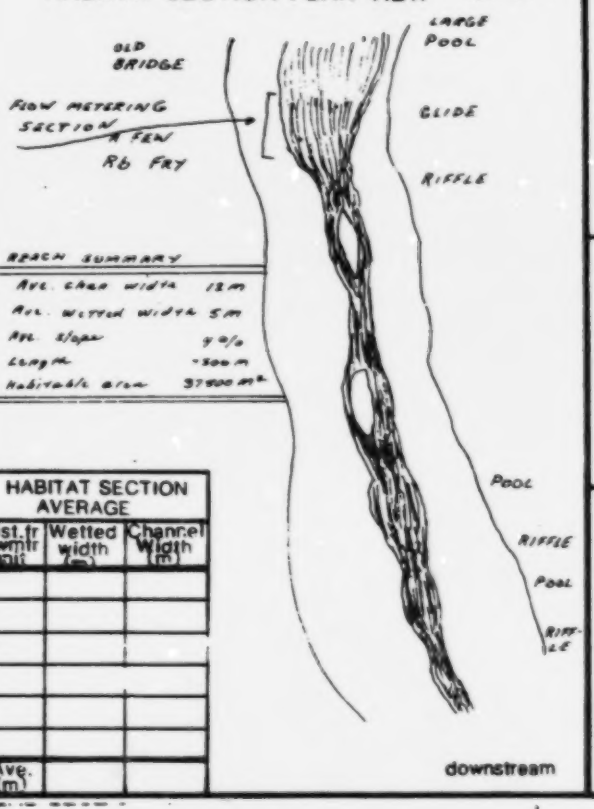
TOTAL : 28690 - 27280

Note : Lois Lake is a fairly shallow impoundment; it could winterkill occasionally

HABITAT FORM COWICHAN Co COLONIZATION

18

HABITAT SECTION PLAN VIEW



HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Meade Creek Reach No. 3
No. 92-4900-650 Point No. of
NTS 92 C/16 Card No. of
Site Location Old bridge 1500 m above the falls
85 | 9 | 15 Time Agency Crew TBJ
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear and warm Air Temp. °C 18
Access Meade Main Water Temp. °C 13

SECTION SUMMARY

Avg. Chan. Width (m)	12	Total Pool (%)	33
Avg. Wetted Width (m)	5	Total Riffle (%)	51
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	500	Total Glide (%)	16
Avg. Slope (%)	4	Total Slough (%)	
Debris (%)	1	Turbidity (cm)	60+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

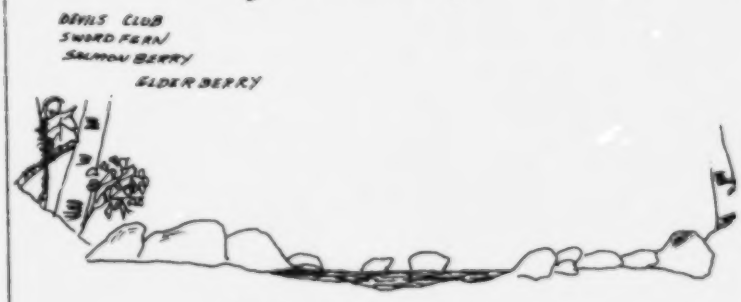
	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	3	5	5	40	45		
riffle	2	2	2	30	64		
run							
glide	5	5	10	40	40		
slough							

D50 (cm) 20 D90 (cm) 90

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M)
WETTED WIDTH (M)
AVE. DEPTH (CM)
WETTED X-SEC. AREA (m^2)
AVE VELOCITY (M/SEC)
FLOW (m^3/SEC) 0.28
9.9 cfs

STREAM CROSS-SECTION (Looking Downstream)



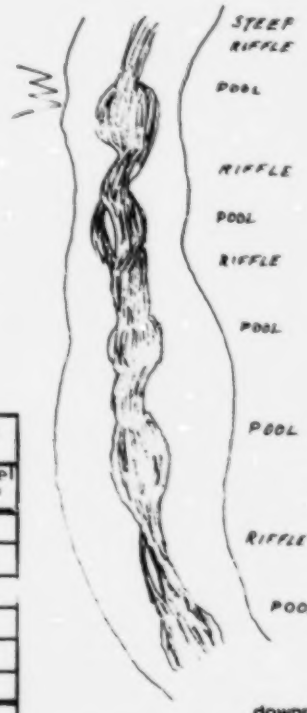
COMMENTS

Resident trout spawn in the pool under the bridge.
Rb density : 0.01 / M²
R3 habitat : 37500 M²
Probability of 5+ gradient in R2 (below falls)
Probable Co smolt yield : 1500
This stream is subject to high discharge fluctuation in fall - winter.

HABITAT FORM COWICHAN Co ENUMERATION

18

HABITAT SECTION PLAN VIEW upstream



HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Meade Creek Reach No. 4
No. 92-4900-650 Point No. of
NTS 92 C/16 Card No. of
Site Location 1000 m above old bridge
85 | 8 | 15 yr mo day Time Agency Crew TB/
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + warm Air Temp. °C 28
Access Meade Main Water Temp. °C 13

SECTION SUMMARY

Avg. Chan. Width (m)	11	Total Pool (%)	50
Avg. Wetted Width (m)	6	Total Riffle (%)	50
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	600	Total Glide (%)	
Avg. Slope (%)	5	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	65 ?

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr	C
pool	1	10	10	50	29	Tr	
riffle	1	5	15	30	49		
run							
glide							
slough							

D50 (cm) 20 D90 (cm) 70

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M)
WETTED WIDTH (M)
AVE. DEPTH (CM)
WETTED X-SEC. AREA (M²)
AVE VELOCITY (M/SEC)
FLOW (M³/SEC) 0.28
9.9 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 400

COMMENTS

Reach 2 Co density : 7/M² !
R6 density 0.01/M²
Good vehicle access from mainline thru old grade after mainline swings uphill away from the stream.
R3 habitat : 37500 M²
Possible smolt yield based on .5 fry/M² : 1500

HABITAT FORM COWICHAN Co COLONIZATION

19

HABITAT SECTION PLAN VIEW

upstream

NOTE: REACH 2 IS A COMPOSITE OF REACHES 2, 3 AND 5. THEY ARE VERY SIMILAR. THE REASON THEY WERE BROKEN DOWN IS A SERIES OF HIGH WATERFALLS THAT FORM LOGICAL BREAKS

downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

Ave chan width	9 M
Ave wetted width	5 M
Ave slope	3.5 %
Length	1500 M
Habitable area	37500 M²

System Name McKay Cr Reach No. 2-5
No. 92-4800-375 Point No. ___ of ___
NTS 92C/16 Card No. ___ of ___
Site Location McKay main Bridge
85 | 8 | 19 Time 1300 Agency ___ Crew TB/
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. Flight line photo nos. x y coordinates
Weather Cloudy + cool Air Temp. °C 17
Access McKay main Water Temp. °C 14

SECTION SUMMARY

Avg. Chan. Width (m)	9	Total Pool (%)	44
Avg. Wetted Width (m)	5	Total Riffle (%)	44
Total Length (m)	50	Total Run (%)	—
Total Wetted Area (m²)	250	Total Glide (%)	12
Avg. Slope (%)	3.5	Total Slough (%)	—
Debris (%)	5	Turbidity (cm)	200 cm.

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul >256 (mm)	Bedr	C
pool	5	5	30	30	30	20	
riffle	1	1	5	30	40	23	
run							
glide	2	5	30	30	33		
slough							

D50 (cm) 30 D90 (cm) 150

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 9
WETTED WIDTH (M) 2
AVE. DEPTH (CM) 12
WETTED X-SEC. AREA (M^2) .24
AVE VELOCITY (M/SEC) .5
FLOW (M^3/SEC) 0.12
4.2 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≡ 280

COMMENTS

Access is poor throughout reach 2; very steep banks or canyon walls. R6 are not present above the third set of falls (5000 M).

Total R2 habitat: 25000 M²
" R3 " 4000
" R4 " 6000

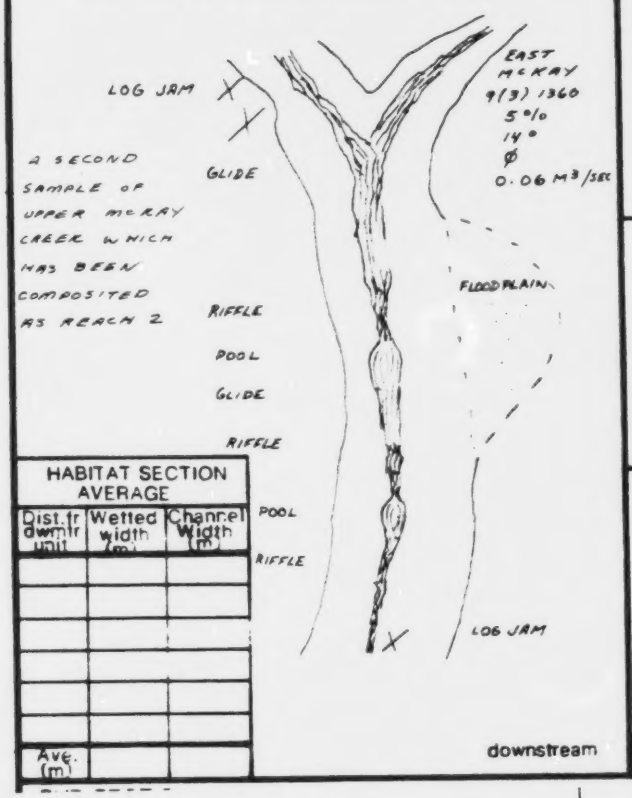
Flow present below average less than 20 cm and are inaccessible.

Co density in accessible section: .5 /M²
Pot. Smolt yield: 9400

HABITAT FORM COWICHAN Co COLONIZATION

19

HABITAT SECTION PLAN VIEW



HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name McKay Reach No. 3 (2)
No. 92-4900-975 Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location E. McKay Confluence
85 | 8 | 19 Time 1400 Agency ___ Crew TB/
yr mo day
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Cloudy + cool Air Temp. °C 18
Access McKay Main + Dust WA Water Temp. °C 14

SECTION SUMMARY

Avg. Chan. Width (m)	13	Total Pool (%)	25
Avg. Wetted Width (m)	4	Total Riffle (%)	38
Total Length (m)	100	Total Run (%)	—
Total Wetted Area (m²)	400	Total Glide (%)	37
Avg. Slope (%)	2.5	Total Slough (%)	—
Debris (%)	20	Turbidity (cm)	25+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	5	30	30	30		
riffle	1	1	5	40	53		
run							
glide	2	2	30	30	36		
slough							

D50 (cm) 20 D90 (cm) 90

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 13
WETTED WIDTH (M) 2
AVE. DEPTH (CM) 12
WETTED X-SEC. AREA (m^2) .24
AVE VELOCITY (M/SEC) 0.5
FLOW (m^3/SEC) 0.12
4.2 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 400

COMMENTS

This zone is very unstable but is not reflective of the composite reach.
Total available habitat: 4000 M²
Inaccessibility is caused by fines backfilled by the log jam
Below falls Co fry density: 0.5 / m²
Possible smolt yield: 160
There are an additional 6000 m² of similar habitat in R4: potential smolt yield: 240
Total Upper McKay Co smolt potential: 1400
R2 above the falls has 25000 m² of fair habitat with a yield potential of 1000 smolt
Total above barrier Co smolt yield for McKay Creek: 1400

HABITAT FORM

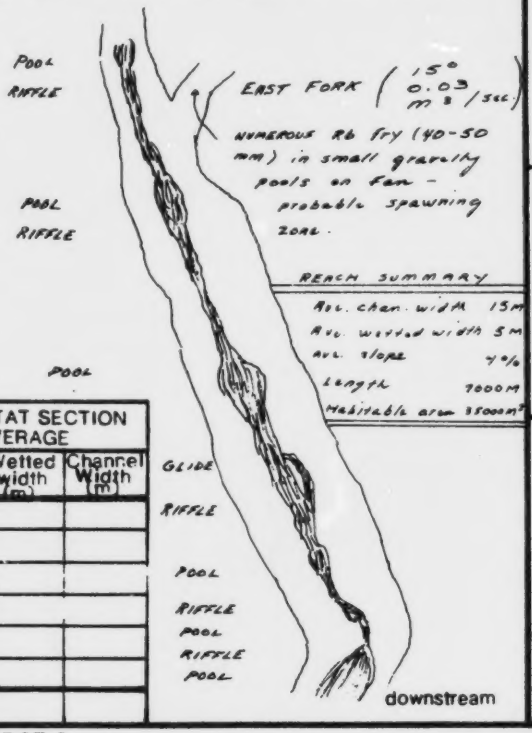
COWICHAN Co COLONIZATION
MIDDLE SHAW

20

HABITAT SECTION PLAN VIEW

upstream

MIDDLE SHAW REACHES
1 + 2 HAVE BEEN COMPOSITED AS REACH 1



HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Middle Fork Shaw Reach No. 1
No. 92-4800-450-500 Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location 100 M below E Fork Confluence
85 | 8 | 13 yr mo day Time ___ Agency ___ Crew TB /
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + warm Air Temp. °C 21
Access North Shaw Main Water Temp. °C 14.0

SECTION SUMMARY

Avg. Chan. Width (m)	18	Total Pool (%)	33
Avg. Wetted Width (m)	5	Total Riffle (%)	49
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	500	Total Glide (%)	16
Avg. Slope (%)	4	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	90+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	8	15	30	42	Tr	
riffle	2	5	10	30	53		
run							
glide	2	10	10	40	48		
slough							

D50 (cm) 40 D90 (cm) 250

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) ___
WETTED WIDTH (M) ___
AVE. DEPTH (CM) ___
WETTED X-SEC. AREA (M^2) ___
AVE VELOCITY (M/SEC) ___
FLOW (M^3/SEC) 0.22
7.7 cfs

STREAM CROSS-SECTION
(Looking Downstream)

COMMENTS

R6 density 0.01 / M^2

Access is excellent for point releasing otho fry. The road closely parallels the stream until about the logging road bridge. Numerous old trails provide fair to good access from the road to the stream.

Total habitat: 35000 M^2

Considered marginal due to gradient and turbulence.

Pot. smolt yield: 1400

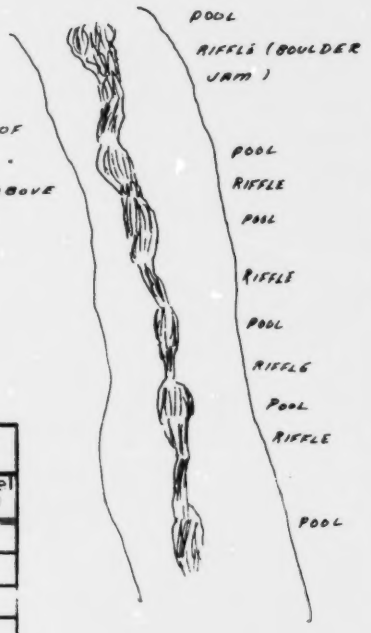
HABITAT FORM

CONICHAN Co COLONIZATION SHAW

20

HABITAT SECTION PLAN VIEW

upstream



SECOND SAMPLE OF MIDDLE SHAW R1. SITE: 1500 M ABOVE FIRST SAMPLE.

downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name: Middle Fork Shaw — Reach No. 1

No.: 92-4800-950-500 — Point No. ___ of ___

NTS: 92 C/16 — Card No. ___ of ___

Site Location: 1 K above junction bridge

85 | 8 | 14 (yr mo day) — Time: 1300 — Agency: ___ — Crew: TB/

Field Photo Init. ___ — Field Photo & Roll No. ___

Air Photo Location No. ___ (flight line) ___ (photo nos.) ___ (x y coordinates)

Weather: Clear & warm — Air Temp. °C: 20

Access: N. Shaw Main — Water Temp. °C: 13

SECTION SUMMARY

Avg. Chan. Width (m)	12	Total Pool (%)	62
Avg. Wetted Width (m)	4	Total Riffle (%)	38
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	400	Total Glide (%)	
Avg. Slope (%)	2-4	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	65+

Side Channel Nil L M H — Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	8	15	30	42	Tr	
riffle	2	5	10	30	53		
run							
glide							
slough							

D50 (cm): 40 — D90 (cm): 250

FLOW SUMMARY

METHOD: FLOAT

CHAN. WIDTH (M): 12

WETTED WIDTH (M): 1

AVE. DEPTH (CM): 10

WETTED X-SEC. AREA (m^2): ___

AVE VELOCITY (M/SEC): ___

FLOW (m^3/SEC): 0.188

6.3 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 290

COMMENTS

RB density 0.02 / m^2. Maximum size: 14 cm.

Total habitat: 35000 M^2

Pot. smolt yield: 1400

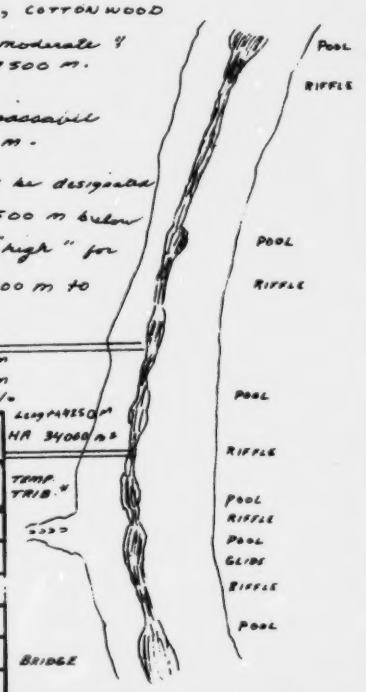
Point stocking access becomes more difficult in upper portions of reach 1 as slope steepens and the valley narrows. Two debris torrents are present near the upper end of the reach.

HABITAT FORM COWICHAN Co COLONIZATION

HABITAT SECTION PLAN VIEW upstream

If I interpret the SNIP map correctly, COTTONWOOD is considered "moderate" fish habitat for 7500 m. WRONG. There is an impassable falls at 2500 m. Habitat should be designated moderate for 1500 m below this point then "high" for the remaining 1000 m to the lake

REACH SUMMARY
Ave. ch. width 11 m
Ave. wetted w 8 m
Ave. slope 3.5 %



HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

* FLOWS THRU THE SUMMER IN MOST YEARS

System Name Cottonwood (Upper) Reach No. 3
No. 92-4800-750 Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location First bridge 6 KS from World Shore Rd.
85 | 8 | 16 yr mo day Time 1500 Agency ___ Crew TB /
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear & warm Air Temp. °C 25
Access Cottonwood main Water Temp. °C 12

SECTION SUMMARY

Avg. Chan. Width (m)	10	Total Pool (%)	33
Avg. Wetted Width (m)	8	Total Riffle (%)	66.6
Total Length (m)	50	Total Run (%)	—
Total Wetted Area (m²)	250	Total Glide (%)	0.4
Avg. Slope (%)	3.5	Total Slough (%)	—
Debris (%)	0	Turbidity (cm)	30+

Side Channel (Nil) L M H Compaction Nil L M H

WETTED BED MATERIAL (%)

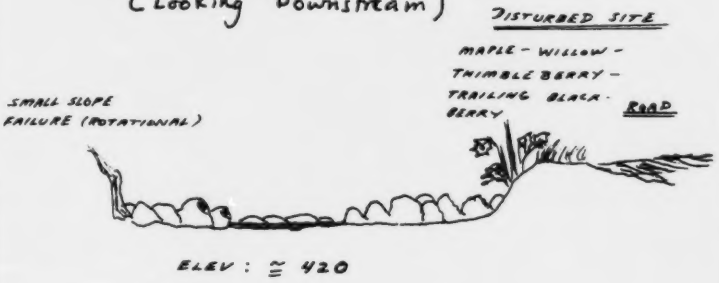
	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	1	3	4	30	62		
riffle	1	1	3	20	75		
run							
glide	1	5	5	40	49		
slough							

D50 (cm) 20 D90 (cm) 70

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 10
WETTED WIDTH (M) 1.5
AVE. DEPTH (CM) 20
WETTED X-SEC. AREA (M²) 0.3
AVE VELOCITY (M/SEC) .38
FLOW (M³/SEC) 0.114
4.02 cfs

STREAM CROSS-SECTION (Looking Downstream)



COMMENTS

Rb density : 0.
Resident rainbow appear to be absent from the portion of this reach above the falls. The falls may be limiting but habitat conditions are also marginal due to lack of depth and turbulence at pool inlets.

NE Fork from Lomas Lake :
FLOW — 0.04 m³/sec (1.4 cfs)
TEMP — 11°
Resident trout and Dollies are apparently absent in this stream
Total R3 habitat : 34000 M²
Quality : marginal

Pot. Smolt yield : 1360

HABITAT FORM COWICHAN Co COLONIZATION

21

HABITAT SECTION PLAN VIEW

N ↑

upstream

LANDING

If I interpret the SHIP map correctly, Cottonwood is considered "moderate" Co habitat for 7500 m. Wrong.

There is an impassable falls at 2500 m.

Habitat should be designated moderate for 1500 m below this point then "high" for the remaining 1000 m to the lake.

REACH SUMMARY

RCW 11 M L 4250 M
AWW 9 m HA 34000 m²
AS 35%

DEEP POOL
GLIDE
RIFFLE
POOL
RIFFLE
POOL
RIFFLE
POOL
RIFFLE
POOL
RIFFLE
POOL

downstream

S

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Cottonwood (middle) Reach No. 3
No. 92-4800-750 Point No. of
NTS 92 C/16 Card No. of
Site Location Landing 1.5 Km above North Shore Rd
85 | 8 | 16 Time 1400 Agency Crew TB
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + warm Air Temp. °C 25
Access Cottonwood Main Water Temp. °C 13

SECTION SUMMARY

Avg. Chan. Width (m)	12	Total Pool (%)	50
Avg. Wetted Width (m)	8	Total Riffle (%)	42
Total Length (m)	100	Total Run (%)	—
Total Wetted Area (m²)	700	Total Glide (%)	8
Avg. Slope (%)	2-4	Total Slough (%)	—
Debris (%)	5	Turbidity (cm)	200 +

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	2	5	8	50	35		
riffle	1	3	5	40	51		
run							
glide	2	7	10	55	26		
slough							

D50 (cm) 25 D90 (cm) 120

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 12
WETTED WIDTH (M) 2
AVE. DEPTH (CM) 20
WETTED X-SEC. AREA (M^2) .4
AVE VELOCITY (M/SEC) .75
FLOW (M^3/SEC) 0.30
10.59 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 230

COMMENTS

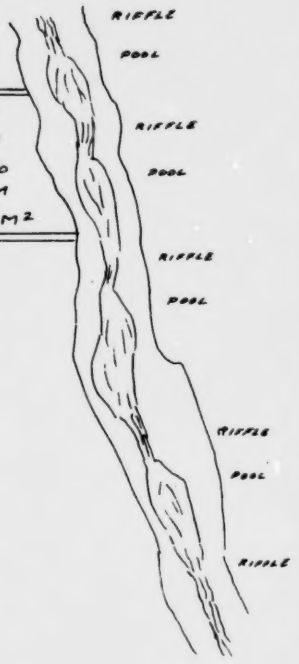
Rb density: 0.023 / M^2
Max. size: 25 cm
These trout attract a light fishery from late summer to mid-fall; none reach legal size (30 cm). There is an occasional late fall lake migrant > 30 cm.
Spring - early summer meltwater is a runoff factor in this basin
Good vehicle access for point stocking
Lower Cottonwood (R1) Co fry density: 2 / M^2
Temp. 16°
R3 Habitat: 34000 M^2

Possible smolt yield: 1360
Note: Eastern brook trout up to 40 cm are sometimes caught in Cottonwood in NOV.

HABITAT FORM COWICHAN Co COLONIZATION

22

HABITAT SECTION PLAN VIEW upstream



downstream

REACH SUMMARY

AVE. CHAN. WIDTH	7M
AVE. WETTED WIDTH	4 M
AVE. SLOPE	2 %
LENGTH	4000 M
HABITABLE AREA	16000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Fallows Cr. Reach No. 3
No. 92-4900-020-700 Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location M main
85 | 8 | 29 (yr mo day) Time 1500 Agency ___ Crew TB / ___
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x ___ y coordinates
Weather Partly cloudy; mild Air Temp. °C 18
Access Hike from M 1.in Water Temp. °C 10

SECTION SUMMARY

Avg. Chan. Width (m)	7	Total Pool (%)	55
Avg. Wetted Width (m)	4	Total Riffle (%)	45
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	400	Total Glide (%)	
Avg. Slope (%)	2.5	Total Slough (%)	
Debris (%)	3	Turbidity (cm)	25+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	3	10	20	30	30	7	
riffle	1	5	10	20	40	24	
run							
glide							
slough							

D50 (cm) 30 D90 (cm) 60

FLOW SUMMARY

METHOD	FLOAT
CHAN. WIDTH (M)	7
WETTED WIDTH (M)	1
AVE. DEPTH (CM)	13
WETTED X-SEC. AREA (M²)	.13
AVE VELOCITY (M/SEC)	.40
FLOW (M³/SEC)	0.052
	1.8 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 510

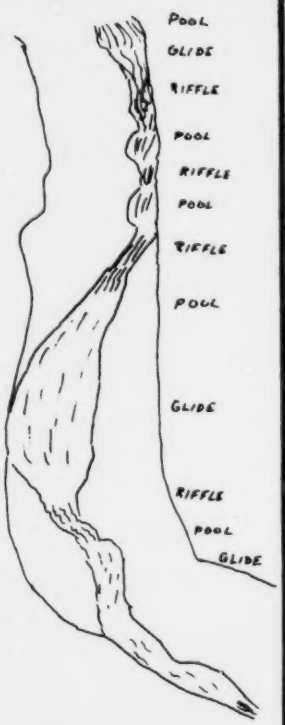
COMMENTS

No trout present
Reasonable Co habitat
Total available Co habitat: 16000 M². Probable smolt yield at 1 fry/M², 8% surv. = 128.
Tributary from the west (92-4900-020-700-200) locally known as McPherson Cr. also has considerable Co capability
Note: It's not known whether Co can ascend the 2.5 m falls in R1; it's likely they cannot. If so, this adds another 10000 M² for a total of 26000. adjusted smolt yield: 1680
Note: This speculation is academic at present because Co are just beginning to colonize the reaches above Marble Falls.
Fallows R1 is considered separately (UNIT 42)

HABITAT FORM COWICHAN Co COLONIZATION

23

HABITAT SECTION PLAN VIEW



REACH SUMMARY

Ave chan width	10 m
Ave. wetted width	6 m
Ave. Slope	3.2 %
Length	5000 m
Habitable area	30000 m²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Upper Robertson Reach No. 3
No. 92-4900-585 Point No. ___ of ___
NTS 92C/9 Card No. ___ of ___
Site Location 30m above Robertson Main bridge
85 | 8 | 25 (yr mo day) Time 1100 Agency ___ Crew TB/
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. ___ flight line ___ photo nos. x y coordinates
Weather Clear + warm Air Temp. °C 22
Access Trans rd. Water Temp. °C 11.5

SECTION SUMMARY

Avg. Chan. Width (m)	10	Total Pool (%)	31
Avg. Wetted Width (m)	6	Total Riffle (%)	23
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	600	Total Glide (%)	46
Avg. Slope (%)	2	Total Slough (%)	
Debris (%)	10	Turbidity (cm)	

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	20	20	30	20		
riffle	5	10	10	40	35		
run							
glide	5	10	10	40	35		
slough							

D50 (cm) 4 D90 (cm) 25

FLOW SUMMARY

METHOD	FLOAT
CHAN. WIDTH (M)	10
WETTED WIDTH (M)	1
AVE. DEPTH (CM)	15
WETTED X-SEC. AREA (M²)	.15
AVE VELOCITY (M/SEC)	.5
FLOW (M³/SEC)	0.075
	2.65 CFS

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 350

COMMENTS

Very low trout density despite quality habitat. They are present but very widely scattered in all areas observed above the falls. Channel width in the first 250 m above the falls increases to 30 - 50 m due to the restriction imposed by the canyon (backfilled bedload

Excellent summer Co habitat the length of R 3.

Total above falls: 30000 m².

Mean gradient: 3.2 % but there are several flats around 2 %. In fact, the lower half of the reach averages 2 %.

Probable smolt yield for the first half: 1200

For the second half: 600

adjusted to 1300 TOTAL 1800 For purposes of continuity, overall yield has been

HABITAT FORM COWICHAN Co COLONIZATION

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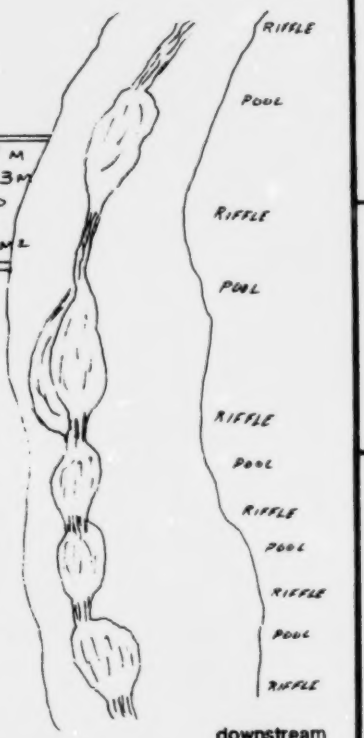
HABITAT SECTION PLAN VIEW



REACH SUMMARY
AVE. CHAN WIDTH 9 M
AVE. WETTED WIDTH 3M
AVE. SLOPE 1.7 %
LENGTH 5000 M
HABITABLE AREA 15000M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Holt Creek Reach No. 2
No. 92-4900-190 Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location Shawnigan Main (N line)
95 | 9 | 29 yr mo day Time 1300 Agency ___ Crew TB/
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x coordinates y coordinates
Weather Partly cloudy, mild Air Temp. °C 19
Access Shawnigan Main Water Temp. °C 11

SECTION SUMMARY

Avg. Chan. Width (m)	9	Total Pool (%)	62
Avg. Wetted Width (m)	3	Total Riffle (%)	38
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	300	Total Glide (%)	
Avg. Slope (%)	2.5	Total Slough (%)	
Debris (%)	1	Turbidity (cm)	30+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr	C
pool	2	10	10	20	58		
riffle	1	5	5	20	69		
run							
glide							
slough							

D50 (cm) 10 D90 (cm) 120

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 9
WETTED WIDTH (M) 1.5
AVE. DEPTH (CM) 8
WETTED X-SEC. AREA (m^2) .12
AVE VELOCITY (M/SEC) .33
FLOW (m^3/SEC) .040
1.40 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 160

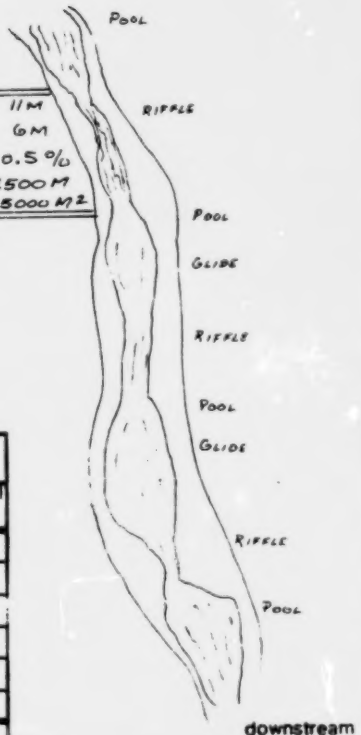
COMMENTS

Trout density: 0.00. 96 + 54 are present in this reach but more were observed in the sample zone where no large pools were present. These fish likely summer in a few deep pools.
Below falls Co density: 1.5/m^2
R2 habitat: 15000
Potential smolt yield: 1200
R3 habitat: 15000
Pot. smolt yield: 600

HABITAT FORM COWICHAN Co COLONIZATION

25

HABITAT SECTION PLAN VIEW upstream



REACH SUMMARY

AVE. CHAN. WIDTH	11M
AVE. WETTED WIDTH	6M
AVE. SLOPE	0.5%
LENGTH	2500M
HABITABLE AREA	15000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Kelvin Creek Reach No. 3
No. 92-4800-020-050 Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location Cabin Bridge near Mountain Rd 100m above falls
85 | 9 | 10 yr mo day Time 1500 Agency ___ Crew TB /
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Cloudy; cool Air Temp. °C 16
Access Path from Mtn. Rd. Water Temp. °C 11

SECTION SUMMARY

Avg. Chan. Width (m)	11	Total Pool (%)	46
Avg. Wetted Width (m)	6	Total Riffle (%)	31
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	600	Total Glide (%)	33
Avg. Slope (%)	0.5	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	20+

Side Channel Nil L (M) H Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	20	30	20	20	Tr	
riffle	5	5	20	40	30	Tr	
run							
glide	10	20	30	20	20		
slough							

D50 (cm) 2 D90 (cm) 12

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 11
WETTED WIDTH (M) .3
AVE. DEPTH (CM) 6
WETTED X-SEC. AREA (M^2) .018
AVE VELOCITY (M/SEC) .5
FLOW (M^3/SEC) .009(2.5) = .023 *
.79 cfs

STREAM CROSS-SECTION (Looking Downstream)

COMMENTS

Trout density : .0003 / M^2
Max. size : 20 cm
Excellent Co habitat (summer and winter)
Total available : 15000 M^2
late summer known Kelvin Co density : 2/ M^2
Potential smolt yield at 8% fry to smolt survival : 1200
Upper Kelvin (R4) carries high, violent winter flow but dries rapidly.
There is some late summer flow (.0008 cms) in the valley tributary at Upper Mtn. Rd. xing but it sinks into gravel and sand 100 m below; a disastrous manouvre.

* Flow gradually decreases upstream : .018 cms at 1000 m above falls, dry above 2500 m

Summer flow originates from two seepage points 2500 m above the falls

HABITAT FORM COWICHAN Co COLONIZATION

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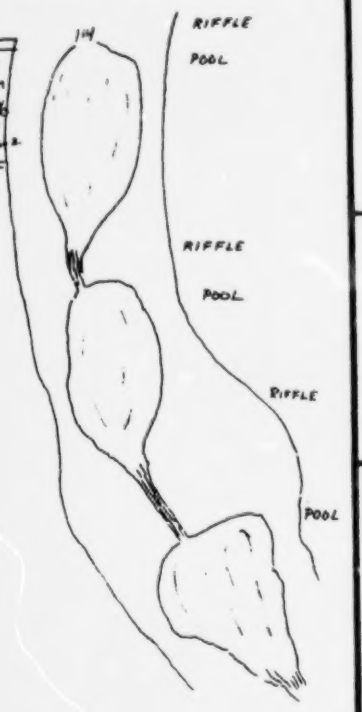
HABITAT SECTION PLAN VIEW upstream

REACH SUMMARY
AVE. CHAN. WIDTH 12M
AVE WETTED WIDTH 3M
AVE SLOPE 0.5%
LENGTH 5000M
HABITABLE AREA 15000M²



downstream

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Cruse - Inwood Reach No. 2
No. 92 - 125 Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location 0 - 100 m below Menzies Rd
85 | 8 | 20 Time 1400 Agency ___ Crew TB /
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Partly cloudy, mild Air Temp. °C 22
Access Path from Menzies Water Temp. °C 15

SECTION SUMMARY

Avg. Chan. Width (m)	12	Total Pool (%)	93
Avg. Wetted Width (m)	3	Total Riffle (%)	17
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	300	Total Glide (%)	
Avg. Slope (%)	0.5	Total Slough (%)	
Debris (%)	1	Turbidity (cm)	

Side Channel (Nil) L M H Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	20	20	20	20	10	10	
riffle	10	20	20	30	10	10	
run							
glide							
slough							

D50 (cm) 3 D90 (cm) 40

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 12
WETTED WIDTH (M) .05
AVE. DEPTH (CM) .01
WETTED X-SEC. AREA (M²) .0005
AVE VELOCITY (M/SEC) .05
FLOW (M³/SEC) .000025
.0009 cfs

COMMENTS 9/15 .043 1.53 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 65

TOTAL HABITAT: 15000 M²
PROBABLE SMOLT YIELD: 1200

TOTAL HABITAT: 15000 M²
POT. SMOLT YIELD: 1200
access exc. for pl. stocking

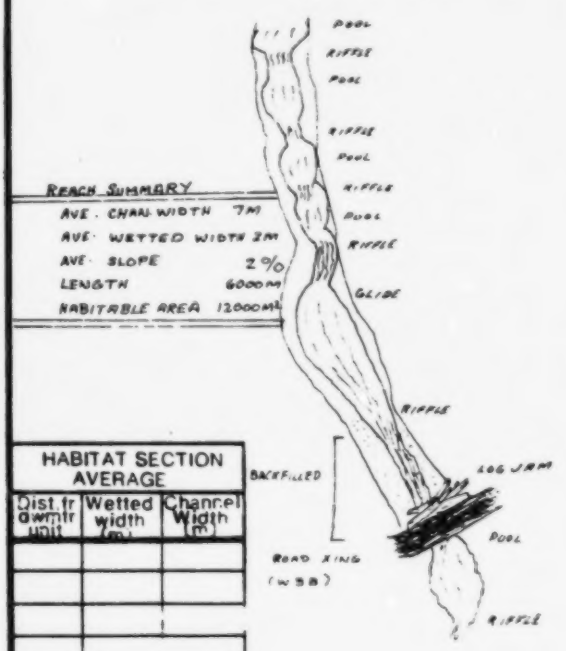
For habitat evaluation purposes, flow is nil. The pools are standing water and there is only movement in steep and narrow riffle/slots. Nonetheless, this area can support a small summer coho population. Pools are large and temperature is moderate.

Ct density: 0. However this reach does support a small trout population with occassional individuals as large as 35 cm reported. The small annual crop of catchable size fish is greatly harvested by local youths between mid-May and early July. One is tempted to say the stream is overfished but, considering its limitations, a dozen or so reel size fish per season is a reasonable figure.

HABITAT FORM COWICHAN CO COLONISATION

UNIT 27 IS A LAKE 28

HABITAT SECTION PLAN VIEW upstream



REACH SUMMARY
AVE. CHAN. WIDTH 7M
AVE. WETTED WIDTH 2M
AVE. SLOPE 2%
LENGTH 6000M
HABITABLE AREA 12000M²

HABITAT SECTION AVERAGE

Dist fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

downstream

System Name Wild Deer Reach No. 2
No. 92-4900-020-425 Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location 3100 M ABOVE FALLS
85 | 9 | 15 Time 1300 Agency ___ Crew TB / ___
yr mo day
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Cloudy, mild Air Temp. °C 15
Access N, W, W58 Water Temp. °C 9

SECTION SUMMARY

Avg. Chan. Width (m)	7	Total Pool (%)	40
Avg. Wetted Width (m)	2	Total Riffle (%)	30
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	200	Total Glide (%)	30
Avg. Slope (%)	2	Total Slough (%)	
Debris (%)	10	Turbidity (cm)	15+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	3	20	40	20	17		
riffle	2	20	40	20	16		
run							
glide	3	20	40	20	17		
slough							

D50 (cm) 3 D90 (cm) 25

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 7
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 7
WETTED X-SEC. AREA (M²) .07
AVE VELOCITY (M/SEC) .50
FLOW (M³/SEC) 0.035
1.24 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 300

COMMENTS

Trout density 0
Some Wild Deer lake rb spawn in the upper few hundred metres of the creek but there doesn't appear to be a resident stream population. Probable reason: very limited habitat (pool depth and hydraulic cover is slight).
The upper .003 metres dry. Summer flow is provided by groundwater seepage from a zone of compacted basal fill 6000 m above the confluence with Nossilah R.
Total habitat: 12000 m²
Co density below falls: 0 (Co have not colonized the Nossilah above Marble Falls).
Expected density based on similar habitat: (Bear R.) 9.5/m².
Potential smolt yield based on 8% fry-smolt survival: 960.
RI 2000 m³/sec
Good access

HABITAT FORM

COWICHAN Co COLONIZATION
SHAW

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HABITAT SECTION PLAN VIEW

upstream

downstream

REACH SUMMARY

AVE. CHAN. WIDTH	10M
AVE. WETTED WIDTH	5M
AVE. SLOPE	5%
LENGTH	4000M
HABITABLE AREA	20000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Upper W. Shaw Reach No. 2
No. 92 - 950 - 350 Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location ≅ 3 KM above Big Meadow
85 | 9 | 14 Time 1500 Agency ___ Crew TB /
yr mo day
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear + Warm Air Temp. °C 19
Access Rough 4WD trail from road Water Temp. °C 11

SECTION SUMMARY

Avg. Chan. Width (m)	10	Total Pool (%)	33
Avg. Wetted Width (m)	5	Total Riffle (%)	41
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	500	Total Glide (%)	26
Avg. Slope (%)	5	Total Slough (%)	
Debris (%)	10	Turbidity (cm)	55+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	3	5	10	20	57	5	
riffle	1	2	5	30	52	10	
run							
glide	1	3	7	40	49		
slough							

D50 (cm) 40 D90 (cm) 70

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) ___
WETTED WIDTH (M) ___
AVE. DEPTH (CM) ___
WETTED X-SEC. AREA (M²) ___
AVE VELOCITY (M/SEC) ___
FLOW (M³/SEC) 0.154
5.4 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 370 M

COMMENTS

Rb x Ct density 0.08 / m². Max size: 25 cm.
Debris is more common here because of recent upstream logging and because hemlock is the dominant streamside conifer. Old growth hemlock contributes considerable debris in the form of branches and whole trees. And lots of needles (leaves).
Total available habitat: 20000 M²
Considered marginal because of high slope and turbulence. There are suitable flats however.
Pot. smolt yield: 800

Good trout population; probably capable of sustaining a light harvest.
Rb x Ct - largely Rb phenotype but small scales and faint hyoid teeth; occ. pale X/sh marks

HABITAT FORM COWICHAN Co ENUMERATION

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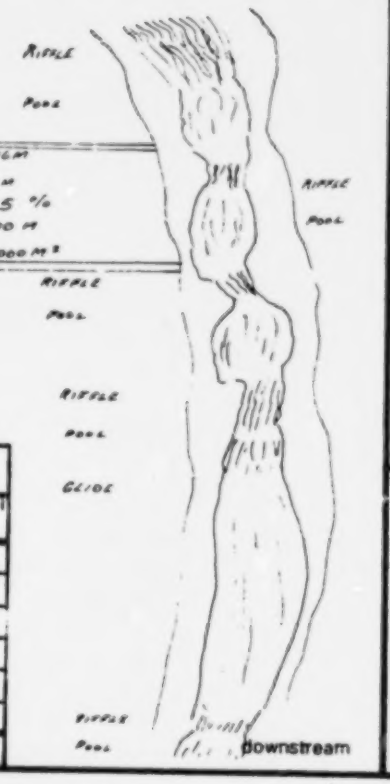
HABITAT SECTION PLAN VIEW upstream



REACH SUMMARY
AVE. CHAN WIDTH 16M
AVE. W/W 6M
AVE. SLOPE 1.5 %
LENGTH 1500 M
HABITABLE AREA 9000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Bear Cr. Reach No. 2
No. 92-4800-400 Point No. of
NTS 92 B/13 Card No. of
Site Location 500 m above falls
85 | 8 | 28 Time 1300 Agency Crew TB
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight lin. photo nos. x coordinates y
Weather Clear & mild Air Temp. °C 21
Access 3240 Haida Rd & bridge, dirt track Water Temp. °C 10

SECTION SUMMARY

Avg. Chan. Width (m)	16	Total Pool (%)	46
Avg. Wetted Width (m)	6	Total Riffle (%)	23
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	600	Total Glide (%)	31
Avg. Slope (%)	1.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	60+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	10	10	30	45	Tr	
riffle	1	5	5	25	64	Tr	
run							
glide	5	10	10	30	45		
slough							

D50 (cm) 10 D90 (cm) 100

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 16
WETTED WIDTH (M) 4
AVE. DEPTH (CM) 26
WETTED X-SEC. AREA (m^2) 1.04
AVE VELOCITY (M/SEC) .33
FLOW (m^3/SEC) 0.34
12.1 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 150

COMMENTS

Trout density : 0.1 /M²
Bear Creek holds its water very well
Co density below falls : 1.5 /M²
Available habitat above falls : 9,000 M²
Fish have improved the falls for steelhead passage but none have been seen above it since the work was done.
1981 - 85 steelhead counts below falls: 16 - 47 (R)
Last channel becomes intermittant (a sidechannel below the falls).
Potential #2 smolt yield : 720

This reach is best suited for steelhead.

An additional 12500 M² of potential habitat is present above the second obstruction.
Pot. smolt yield : 500
TOTALS : Habitat - 21,500 Smolts 1200

HABITAT FORM Cowichan Co Colonization

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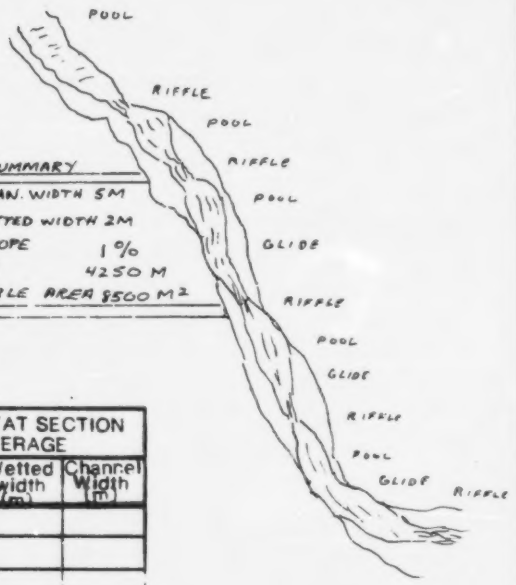
HABITAT SECTION PLAN VIEW

upstream



REACH SUMMARY
AVE. CHAN. WIDTH 5M
AVE. WETTED WIDTH 2M
AVE. SLOPE 1%
LENGTH 4250 M
HABITABLE AREA 8500 M2

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

downstream

System Name McPherson Cr. Reach No. 3
No. 92-4500-020-700-20° Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location m.13 x 11m
85 | 8 | 27 yr mo day Time 1650 Agency ___ Crew TB / ___
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Partly cloudy, warm Air Temp. °C 15
Access X 11m branch Water Temp. °C 10

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	60
Avg. Wetted Width (m)	2	Total Riffle (%)	20
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	200	Total Glide (%)	40
Avg. Slope (%)	1.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	30+

Side Channel Nil (1) M H Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	20	30	20	10		
riffle	5	20	30	30	15		
run							
glide	10	20	30	20	10		
slough							

D50 (cm) 5 D90 (cm) 25

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) .5
AVE. DEPTH (CM) 7
WETTED X-SEC. AREA (m^2) .035
AVE VELOCITY (M/SEC) .3
FLOW (m^3/SEC) .012

COMMENTS .37 cfs
.44 cfs
600 m downstream

STREAM CROSS-SECTION
(Looking Downstream)

ELEV = 360

Trout density: 0

Total habitat: 8500 m² (Stream)

Potential smolt yield at 1 fry/m² and 8% fry-smolt survival: 680

With wetland impoundment: (8 HA): 64,000

However, it's doubtful if the main wetlands can store enough quality water to support Co. They are in an advanced stage of maturity (Spirea - Ledum - Salix Fen) with small catchment area and dry early.

Pot. smolt yield of R1 below the falls: 60 ; R2 400

Pot. smolt yield of headwater lake:
as is - 2400
with impoundment - 4800

ESTIMATED TOTAL (DISCOUNTING THE TRIB. WETLANDS): 5940

HABITAT FORM COWICHAN Co COLONIZATION

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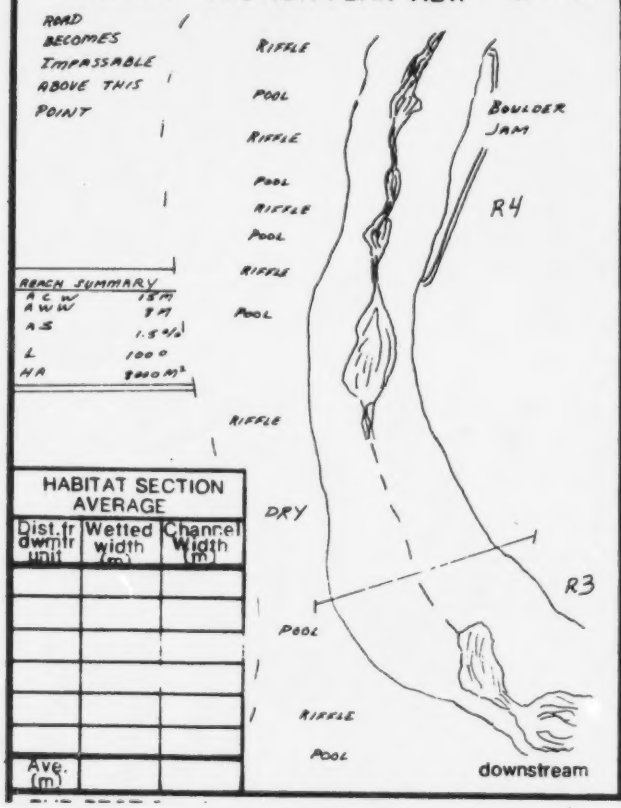
HABITAT SECTION PLAN VIEW



HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name East Robertson Reach No. 3
No. 92-4900-585-400 Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location 2000 M upstream from confluence
85 | 8 | 24 (yr mo day) Time 1200 Agency ___ Crew TBI
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear + warm Air Temp. °C 25
Access E. Main Water Temp. °C 15

SECTION SUMMARY

Avg. Chan. Width (m)	15	Total Pool (%)	55
Avg. Wetted Width (m)	9	Total Riffle (%)	45
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	800	Total Glide (%)	
Avg. Slope (%)	1.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	40+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	3	5	5	20	67	Tr	
riffle	1	3	3	10	83	Tr	
run							
glide							
slough							

D50 (cm) 20 D90 (cm) 150

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 15
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 22
WETTED X-SEC. AREA (m²) .22
AVE VELOCITY (M/SEC) .35
FLOW (m³/SEC) 0.077
2.7 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 900

COMMENTS

No trout are present above the falls.
This stream is very steep and subject to violent discharge.
Reach 3 is suitable summer Co habitat but lacks winter retreat space.
Robertson mainstem flow below E. Robertson confluence: 0.28 CMS. Temp. 15° Co density 3/M².
Most Robertson Co fry leave the stream with the onset of cool weather to winter in Bear Lake or Cowichan Lake.
Total habitat: (R3) 3000 M²
Pot. smolt yield: 640

HABITAT FORM COWICHAN Co COLONIZATION

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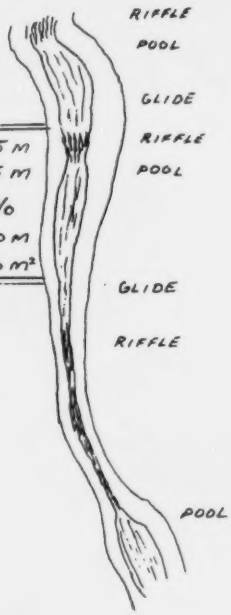
HABITAT SECTION PLAN VIEW upstream



downstream

REACH SUMMARY

AVE. CHAN. WIDTH	8.5 M
AVE. WETTED WIDTH	5 M
AVE. SLOPE	1 %
LENGTH	1500 M
HABITABLE AREA	7500 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Binga Cr. Reach No. 3
No. 92-060-650 Point No. of
NTS 92 B/13 Card No. of
Site Location 250 m W of R 2 boundary
85 | 8 | 20 Time 1100 Agency Crew TB /
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Partly cloudy Air Temp. °C 22
Access E+N grade Water Temp. °C 14

SECTION SUMMARY

Avg. Chan. Width (m)	8.5	Total Pool (%)	45
Avg. Wetted Width (m)	5	Total Riffle (%)	35
Total Length (m)	70	Total Run (%)	
Total Wetted Area (m²)	350	Total Glide (%)	20
Avg. Slope (%)	0.1	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	30+

Side Channel Nil (L) M H Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	10	40	30	15	Tr	
riffle	5	10	30	40	15	Tr	
run							
glide	5	10	40	30	15		
slough							

D50 (cm) 3 D90 (cm) 30

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 8.5
WETTED WIDTH (M) 1.5
AVE. DEPTH (CM) 15
WETTED X-SEC. AREA (M²) .225
AVE VELOCITY (M/SEC) .25
FLOW (M³/SEC) 0.056
1.97 cfs

STREAM CROSS-SECTION
(Looking Downstream)

ALDER - NINEBARK

ELEV: ≅ 40

COMMENTS

Ct pair density : 0.014 / M²
Excellent co habitat
Reach 1 discharge : 0.026 M³/sec
0.94 cfs

Reach 1 co density : 3 / M²
Total habitat : 7500 m²
Possible smolt yield : 1800
Smolt yield @ 1 fry / m² : 600

Brown trout have been introduced to this reach, they have not prospered so far. Contact Rick Axford re Ken Broadland - Gary Newcastle.

HABITAT FORM Cowichan Co Colonization

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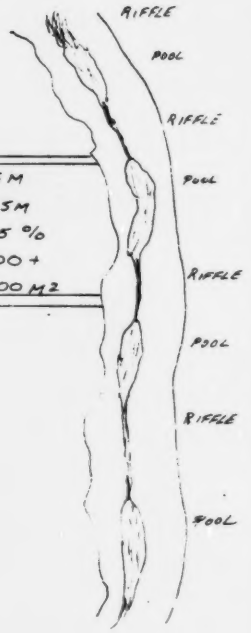
HABITAT SECTION PLAN VIEW

upstream



downstream

REACH SUMMARY

AVE. CHAN. WIDTH	15 M
AVE WETTED WIDTH	4.5M
AVE. SLOPE	2.5 %
LENGTH	3100+
HABITABLE AREA	14000 M2

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Yeux Yaksilah — Reach No. 4
No. 92-4300 — Point No. ___ of ___
NTS 92 B/12 — Card No. ___ of ___
Site Location above + below high falls
85 | 9 | 10 (yr mo day) Time ___ Agency ___ Crew TB /
Field Photo Init. Field Photo & Roll No
Air Photo Location No. ___ flight line ___ photo nos. ___ x ___ y coordinates
Weather clear, warm — Air Temp. °C 17°
Access BCFP River valley main M+S SA. M BC. — Water Temp. °C 11°

SECTION SUMMARY

Avg. Chan. Width (m)	15	Total Pool (%)	55
Avg. Wetted Width (m)	4.5	Total Riffle (%)	45
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	450	Total Glide (%)	
Avg. Slope (%)	2.5	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	40+

Side Channel (Nil) L M H — Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool							
riffle							
run							
glide							
slough							

D50 (cm) ___ D90 (cm) ___

FLOW SUMMARY

METHOD	FLOAT
CHAN. WIDTH (M)	15
WETTED WIDTH (M)	.5
AVE. DEPTH (CM)	17
WETTED X-SEC. AREA (m^2)	.085
AVE VELOCITY (M/SEC)	.25
FLOW (m^3/SEC)	.021
	0.74 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

Obstruction is a huge boulder jam wedged in a steep and narrow canyon - 30 R 50 with several 4 M vertical drops
Flow has not improved from R5
Excellent steelhead habitat; fry density: 1/M². NO coho.

HABITAT FORM Cowichan Co Colonization

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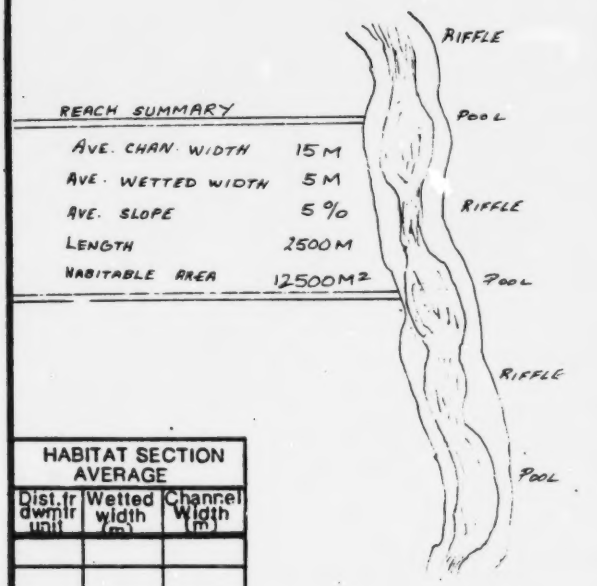
HABITAT SECTION PLAN VIEW

upstream



downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Bear Creek Reach No. 3
No. 92-4900-400 Point No. ___ of ___
NTS 92 B/12 , B/13 Card No. ___ of ___
Site Location
85 | 7 | 24 Time 1400 Agency ___ Crew TB /
yr mo day
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather clear; warm Air Temp. °C 24
Access wade + swim 2nd canyon; wade + paddleback Water Temp. °C 10

SECTION SUMMARY

Avg. Chan. Width (m)	15	Total Pool (%)	62
Avg. Wetted Width (m)	5	Total Riffle (%)	38
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	500	Total Glide (%)	
Avg. Slope (%)	5	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	50+

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	10	10	30	45	Tr	
riffle	1	5	5	25	64	Tr	
run							
glide							
slough							

D50 (cm) 10 D90 (cm) 100

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 15
WETTED WIDTH (M) 4
AVE. DEPTH (CM) .32
WETTED X-SEC. AREA (M²) 1.28
AVE VELOCITY (M/SEC) .33
FLOW (M³/SEC) 0.42
14.9 cfs

STREAM CROSS-SECTION (Looking Downstream)

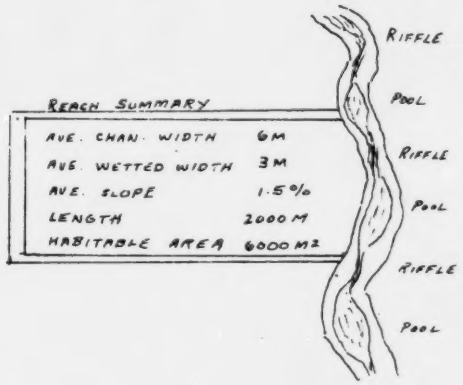
ELEV ≅ 180

COMMENTS

Rb density 0.1 / M²
Fair numbers of fish in pools; captured several mature individuals still migrating from spawning. The largest was 16 cm.
This reach is best suited for steelhead
Pot. coho smolt yield = 500
Aerial stocking will be required; ground access with equipment (even backpack tanks) is impossible unless is was done in summer by a group. Swimming is necessary to pass the second canyon.

HABITAT FORM COWICHAN Co COLONIZATION

HABITAT SECTION PLAN VIEW upstream



REACH SUMMARY

AVE. CHAN. WIDTH	6M
AVE. WETTED WIDTH	3M
AVE. SLOPE	1.5%
LENGTH	2000 M
HABITABLE AREA	6000 M2

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

downstream

System Name Old Truck Reach No. 2
No. Point No. of
NTS 92 B/12 Card No. of
Site Location 50 m above M main
85 | 9 | 1 (yr mo day) Time Agency Crew TB /
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Partly cloudy, mild Air Temp. °C 17
Access Shawnigan M Water Temp. °C 7

SECTION SUMMARY

Avg. Chan. Width (m)	6	Total Pool (%)	60
Avg. Wetted Width (m)	3	Total Riffle (%)	40
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	150	Total Glide (%)	
Avg. Slope (%)	1.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	20+

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	30	40	10	10		
riffle	5	20	40	15	20		
run							
glide							
slough							

D50 (cm) 2 D90 (cm) 20

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 6
WETTED WIDTH (M) .2
AVE. DEPTH (CM) 5
WETTED X-SEC. AREA (m^2) .01
AVE VELOCITY (M/SEC) .2
FLOW (m^3/SEC) .002
.07 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 540

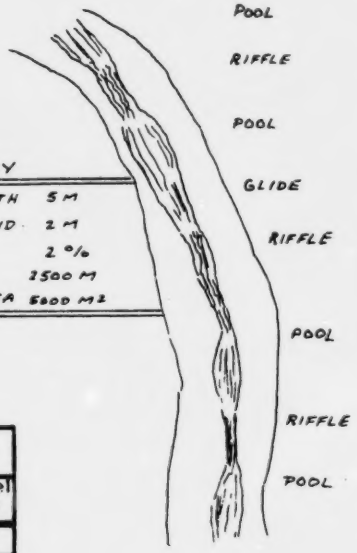
The name "Old Truck" is my own. M+B sometimes park old pickup trucks near the creek.

This stream may be too small for Co rearing at 1/M. Riffles are very shallow in late summer.

R1 is close to being potentially habitable at 0.5/m. Calculated gradient is 6% but most of the drop is near the confluence. R1 was not surveyed. If it averages below 5%, pot. smolt yield is 120 (750 x 4 x .5 x .08).

HABITAT FORM COWICHAN Co COLONIZATION

HABITAT SECTION PLAN VIEW upstream



downstream

REACH SUMMARY

AVE. CHAN. WIDTH	5 M
AVE. WETTED WID.	2 M
AVE. SLOPE	2 %
LENGTH	1500 M
HABITABLE AREA	5000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Binga Creek (MENZIES CR.) Reach No. 1
No. 92-1105-960-680 Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location 300 M above old LC Rd
85 | 8 | 20 Time 1200 Agency ___ Crew TB/
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. ___ flight line ___ photo nos. x ___ y ___ coordinates
Weather Partly cloudy Air Temp. °C 22
Access old grade Water Temp. °C 9

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	53
Avg. Wetted Width (m)	2	Total Riffle (%)	38
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	100	Total Glide (%)	9
Avg. Slope (%)	2	Total Slough (%)	
Debris (%)	0	Turbidity (cm)	10+

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	2	10	40	40	8		
riffle	1	5	40	45	9		
run							
glide	2	10	40	40	8		
slough							

D50 (cm) 3 D90 (cm) 30

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 7
WETTED X-SEC. AREA (M²) .07
AVE VELOCITY (M/SEC) .5
FLOW (M³/SEC) .035
1.24 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 65

COMMENTS

Summer flow results from periodic seepage of cold groundwater, hence the low temperature (9°).

Trout (cut) density: 0

Cut Fry are present in this reach until mid-July. They move down to the area below old Lake Cowichan Rd then. Parr and adults (up to 35 cm) are also present between old Lake Cowichan Rd. and Gibbons Rd. but in very small numbers. Local kids trap them trapped at low levels.

Total Habitat: 5000 M²

Potential smolt yield at 1 fry/M² and 8 % fry - smolt survival: 400

HABITAT FORM COWICHAN CO COLONIZATION

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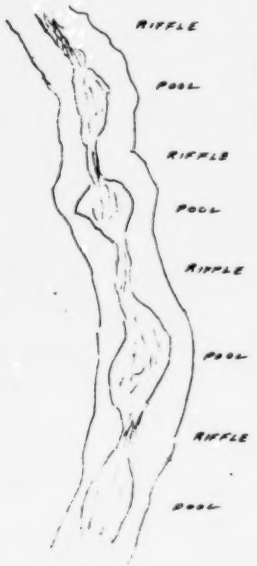
HABITAT SECTION PLAN VIEW upstream



downstream

REACH SUMMARY

ACW	11 M
AWW	5 M
AS	5 %
L	2000 M
WA	10000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Goat Shaw Reach No. 1
No. Point No. of
NTS 92 I/16 Card No. of
Site Location 300 m below xing
85 | 8 | 13 Time Agency Crew TB /
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + warm Air Temp. °C 18
Access Shaw Main E Water Temp. °C 15

SECTION SUMMARY

Avg. Chan. Width (m)	11	Total Pool (%)	62
Avg. Wetted Width (m)	5	Total Riffle (%)	38
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	500	Total Glide (%)	
Avg. Slope (%)	5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	40+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	8	15	30	42		
riffle	2	5	10	30	53		
run							
glide							
slough							

D50 (cm) 40 D90 (cm) 230

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 11
WETTED WIDTH (M)
AVE. DEPTH (CM)
WETTED X-SEC. AREA (M²)
AVE VELOCITY (M/SEC)
FLOW (M³/SEC) .03
1.2 cfs

COMMENTS

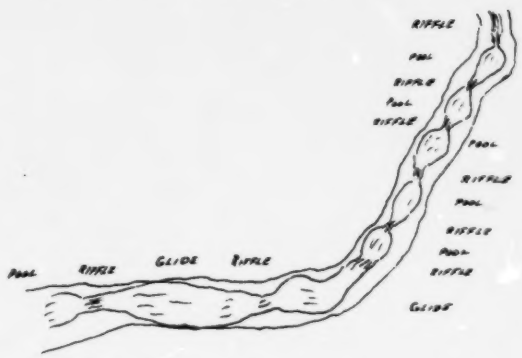
STREAM CROSS-SECTION (Looking Downstream)

ELEV = 340

Marginal CO habitat; better suited for ST.
Rb density: 0.02/M²
Temp. and discharge influenced by Gillespie Lake; the main flow source. Despite its elevation (920 m), this lake is fairly productive. It supports surprising summer zooplankton densities and, at one time, produced some very large rainbows. It was stocked by Cowichan area pioneer, Ken Gillespie in 1932. Very limited spawning habitat (a few metres at the outlet and perhaps a few at the inlet) gave surviving fry a chance to grow large (up to 3 kg.). The BCFFA or. has stocked the lake since the 1960's. Rb now average 25 cm at maturity.

HABITAT FORM CONICHAN Cr COLONIZATION

HABITAT SECTION PLAN VIEW upstream



downstream

System Name Richards Cr Reach No. ____
No. 92-4800-060-900 Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location Powerline
95 | 9 | 5 Time 1500 Agency ___ Crew TB /
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Cloudy; mild Air Temp. °C 19
Access Hand Rd - Crofton - Maple Bay Rd. Water Temp. °C 12

SECTION SUMMARY

Avg. Chan. Width (m)	4	Total Pool (%)	30
Avg. Wetted Width (m)	2	Total Riffle (%)	30
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	200	Total Glide (%)	40
Avg. Slope (%)	2	Total Slough (%)	
Debris (%)	1	Turbidity (cm)	15+

Side Channel (Nil) L M H Compaction Nil L (M) H

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW	4 m
AWW	2 m
AS	2 %
L	2500 m
HA	5000 m²

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	10	20	20	40	Tr	
riffle	2	5	5	40	45	Tr	
run							
glide	10	10	20	20	40		
slough							

D50 (cm) 5 D90 (cm) 50

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 4
WETTED WIDTH (M) .6
AVE. DEPTH (CM) 12
WETTED X-SEC. AREA (M^2) .072
AVE VELOCITY (M/SEC) .2
FLOW (M^3/SEC) 0.014
0.51 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≈ 65

COMMENTS

The stream is a little too small for optimum Co rearing. Width and depth are limiting. Nonetheless, it is capable of some production. The short habitable section below the falls (R2) has had 50 capements as large as 50 in its 3000 m² of habitat which is of similar character to upstream habitat.

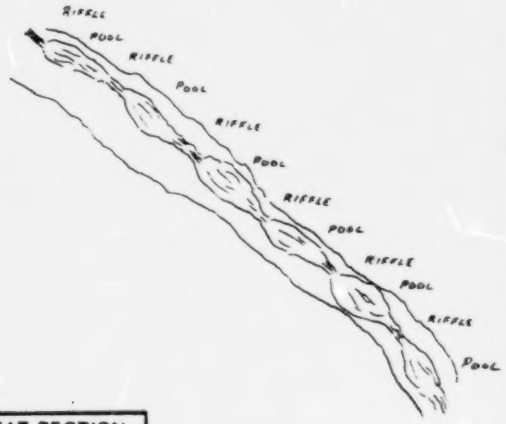
Total available habitat: 5000 m²
Plus Crofton Res. 22.5 H
R2 summer Co density: 2/m²
Potential R3 smolt yield based on 8 % fry - smolt survival: 400
Crofton reservoir could produce 11000 Co smolts

HABITAT FORM COWICHAN

40

HABITAT SECTION PLAN VIEW

upstream



downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW	7m
AWW	2m
AS	15 %
L	2500m
WA	5000 m²

System Name West Kok. Br. 2 Reach No. ____

No. 92-4800-020-670-180 Point No. ____ of ____

NTS 92 B/12 Card No. ____ of ____

Site Location mouth R line 1000 m above falls

85 | 9 | 7 Time 1400 Agency ____ Crew TB /

yr mo day

Field Photo Init. ____ Field Photo & Roll No. ____

Air Photo Location No. ____ flight line ____ photo nos. ____ x y coordinates

Weather Clear, cool Air Temp. °C 15

Access BCFP A line, mile N Water Temp. °C 8

SECTION SUMMARY

Avg. Chan. Width (m)	7	Total Pool (%)	70
Avg. Wetted Width (m)	2	Total Riffle (%)	30
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	200	Total Glide (%)	
Avg. Slope (%)	1.6	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	20+

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	40	40	15			
riffle	2	40	50	8			
run							
glide							
slough							

D50 (cm) 2 D90 (cm) 10

FLOW SUMMARY

METHOD FLOAT

CHAN. WIDTH (M) 7

WETTED WIDTH (M) .5

AVE. DEPTH (CM) 5

WETTED X-SEC. AREA (M^2) .025

AVE VELOCITY (M/SEC) .25

FLOW (M^3/SEC) .006

.22 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 540

Reasonable summer Co habitat with short areas of excellent capability (pocket wetlands).

Total available: ≅ 5000 M^2 - pot. smolt yield: 400

Flow increases to .017 CMS below first falls. There is a stretch of fair quality habitat in the break between the first falls and the upper canyon: ≅ 8000 M^2 (upper RI) - pot. smolt yield: 320

Note: there is a problem in determining upper limits of anadromous salmonid passage in the Kokanee system. No coho fry have been observed above Marble Falls this year (or any other by this observer).

HABITAT FORM COWICHAN CO COLONIZATION

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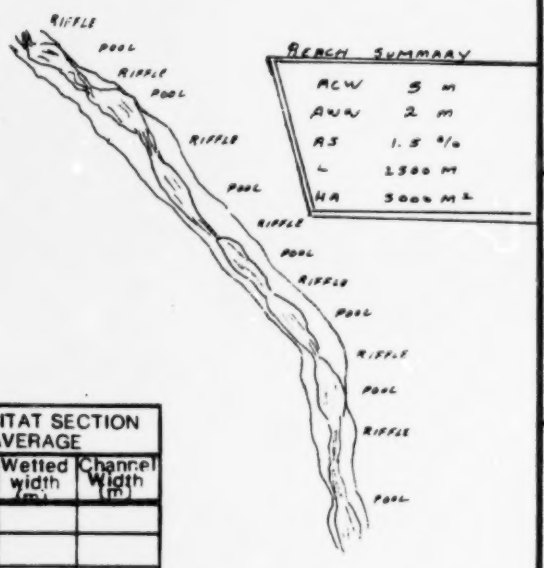
HABITAT SECTION PLAN VIEW upstream



downstream

HABITAT SECTION AVERAGE		
Dist. to dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name McPherson Reach No. 2
No. 92-4700-020-700-200 Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location Sites along main & main x line
85 (yr) | 8 (mo) | 29 (day) Time 1600 Agency ___ Crew TB / ___
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x coordinates ___ y
Weather Partly cloudy / warm Air Temp. °C 15
Access Hike from main x line Water Temp. °C 10

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	60
Avg. Wetted Width (m)	2	Total Riffle (%)	40
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	200	Total Glide (%)	
Avg. Slope (%)	1.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	25+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	2	10	20	30	38	Tr	
riffle	1	5	20	40	34		
run							
glide							
slough							

D50 (cm) 10 D90 (cm) 60

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) .5
AVE. DEPTH (CM) 10
WETTED X-SEC. AREA (m^2) .05
AVE VELOCITY (M/SEC) .85
FLOW (m^3/SEC) .013
.44 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≈ 520

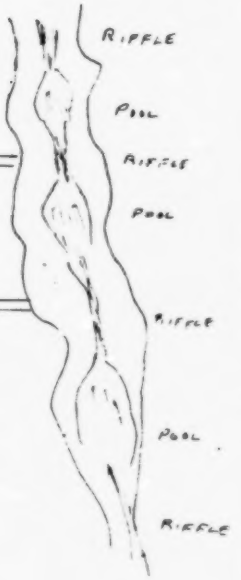
Trout density : 0
Total habitat : 5000 m²
Potential smolt yield at 1 fry / m² and 8 % fry - smolt survival : 400
The portion of R1 below the falls has a potential smolt yield of 120.
R2 tributary wetlands (Spirea - Ledum - Carex - Salix) - HA - have a yield potential of ___ with impoundment. More research is required to determine if enough quality water can be stored through the summer to sustain Co. In my judgement, it cannot. These wetlands are summer dry fens with very small catchment areas. Impounded water would likely be stagnant with a high oxygen demand. It would be very beneficial to store water in this wetland type to determine whether or not salmonids can be produced.
A Key question: What wetland type was Dr Hamil's Creek Bradford Swamp prior to impoundment?

HABITAT FORM

42

HABITAT SECTION PLAN VIEW

upstream



downstream

REACH SUMMARY

ACW	15 m
AWW	4 m
As	2.5 %
L	2500 m
HA	10000 m²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Fallows Cr. (R1) Reach No. 1
No. 92-4500-020-700 Point No. of
NTS 92 B/12 Card No. of
Site Location 50 M above Hazelton confluence
85 | 9 | 10 Time Agency Crew TG / JL
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather clear + warm Air Temp. °C 21
Access Hwy 16 Water Temp. °C 12

SECTION SUMMARY

Avg. Chan. Width (m)	15	Total Pool (%)	62
Avg. Wetted Width (m)	4	Total Riffle (%)	38
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	400	Total Glide (%)	
Avg. Slope (%)	2.5	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool							
riffle							
run							
glide							
slough							

D50 (cm) _____ D90 (cm) _____

FLOW SUMMARY

METHOD Float
CHAN. WIDTH (M) 15
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 20
WETTED X-SEC. AREA (M²) 0.2
AVE VELOCITY (M/SEC) .25
FLOW (M³/SEC) .05

1.77 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

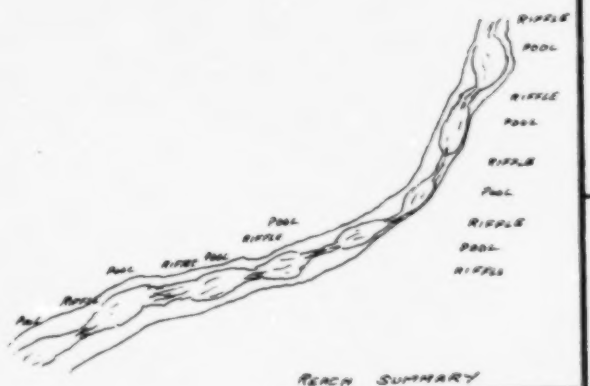
ELEV ≈ 320

Marginal CO habitat

Good St habitat

HABITAT FORM CONNAHAN Co COLONISATION

HABITAT SECTION PLAN VIEW upstream



downstream

REACH SUMMARY

AVE. CHAN. WIDTH	5 M
AVE. WETTED WIDTH	2 M
AVE. SLOPE	1.5 %
LENGTH	2500 M
HABITABLE AREA	5000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name South Korsilak Mainstem Reach No. -1 *
No. 92-4900-020-670 Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location RENFREW RD
85 | 9 | 7 (yr mo day) Time 1000 Agency ___ Crew TBI
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. ___ flight line ___ photo nos. x y coordinates
Weather Clear ; cool Air Temp. °C 17
Access Bridge Water Temp. °C 8

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	70
Avg. Wetted Width (m)	2	Total Riffle (%)	30
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	200	Total Glide (%)	
Avg. Slope (%)	1.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	15+

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	1	3	3	10	40	43	
riffle	0	2	5	20	30	43	
run							
glide							
slough							

D50 (cm) 20 D90 (cm) 60

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) .4
AVE. DEPTH (CM) 16
WETTED X-SEC. AREA (M^2) .064
AVE VELOCITY (M/SEC) .25
FLOW (M^3/SEC) 0.016
0.56 cfs

STREAM CROSS-SECTION (Looking Downstream)

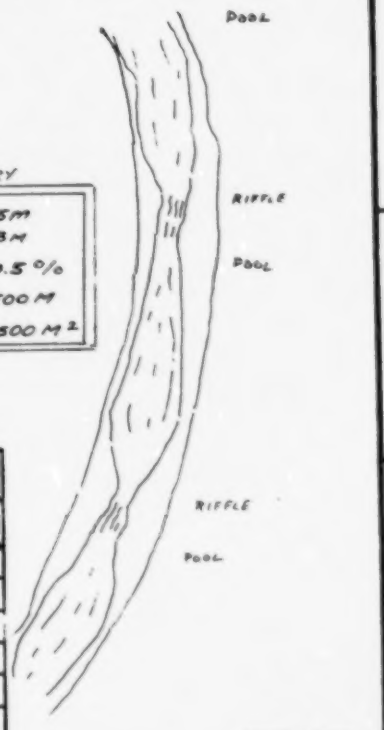
ELEV: ≅ 480

COMMENTS

Entire stream is considered one reach
Nights have been cool for 3 days - down to 5°
Marginal summer Co habitat overall although there are some pocket wetlands that have much higher capability.
This area has the highest percentage of bedrock in the reach.
Available habitat: 5000 M²
Probable summer Co carrying capacity: 1 /M²
Potential smolt yield at 8% survival from summer egg: 400

HABITAT FORM COWICHAN Co COLONIZATION

HABITAT SECTION PLAN VIEW upstream



REACH SUMMARY

AVE CH. WIDTH	5M
AVE W. WIDTH	3M
AVE SLOPE	0.5 %
LENGTH	1500 M
HABITABLE AREA	4500 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Swampwater Cr. Reach No. 2
No. 92-4300-595 (16Co trib.) Point No. ___ of ___
NTS 92C/9 Card No. ___ of ___
Site Location 50m above + below jctn. of Renfrew Rd + Lake main
85 | 9 | 25 yr mo day Time 1400 Agency ___ Crew TB / ___
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear + warm Air Temp. °C 23
Access Roadside Water Temp. °C 12

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	75
Avg. Wetted Width (m)	3	Total Riffle (%)	25
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	300	Total Glide (%)	
Avg. Slope (%)	0.5	Total Slough (%)	
Debris (%)	20	Turbidity (cm)	15+

Side Channel (Nil) L M H Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	15	30	50	5			
riffle	10	30	50	10			
run							
glide							
slough							

D50 (cm) 2 D90 (cm) 12

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) .2
AVE. DEPTH (CM) 5
WETTED X-SEC. AREA (m²) 0.01
AVE VELOCITY (M/SEC) .16
FLOW (m³/SEC) 0.0017
0.051 cfs

STREAM CROSS-SECTION (Looking Downstream)

COMMENTS

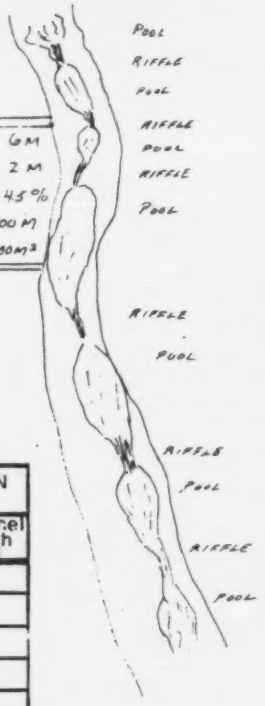
CT fry density: 2/M² (no pass seen).
Co fry density below culvert: 2/M²
Co access prevented by culverts under an unused spur road between Renfrew Rd. and Robertson main. Culverts should be removed.
Fishery Officer Tupman was advised in 1993.
First 30 m above culverts dry.
Available habitat: 4500 M². Probable smolt yield @ 1 fry/M², 8% fry-smolt surv. 360
Quality: excellent.
Swampwater Creek is a tributary of Sixteen Cr., a major Robertson R. tributary.

Sixteen Creek temp. and flow on 9/25/95: 11°, 0.066 cms.
Co density: 0.5 / M²

HABITAT FORM COWICHAN Co COLONIZATION

45

HABITAT SECTION PLAN VIEW upstream



downstream

REACH SUMMARY

AVE. CHAN. WID.	6 M
AVE. WETTED WID.	2 M
AVE. SLOPE	4.5%
LENGTH	4300 M
HABITABLE AREA	8600 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Upper E. Robertson Reach No. 7
No. 92-4800-585 Point No. ___ of ___
NTS 92C/16 Card No. ___ of ___
Site Location M+B R5
85 | 9 | 29 (yr mo day) Time 1500 Agency ___ Crew TB/
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + Warm Air Temp. °C 22
Access M+B R line (Shawnigan Div.) Water Temp. °C 11

SECTION SUMMARY

Avg. Chan. Width (m)	6	Total Pool (%)	64
Avg. Wetted Width (m)	2	Total Riffle (%)	36
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	200	Total Glide (%)	
Avg. Slope (%)	4.5	Total Slough (%)	
Debris (%)	15	Turbidity (cm)	

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	10	15	35	30	5	
riffle	2	10	13	30	30	13	
run							
glide							
slough							

D50 (cm) 10 D90 (cm) 80

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) .5
AVE. DEPTH (CM) 7
WETTED X-SEC. AREA (M²) .035
AVE VELOCITY (M/SEC) .5
FLOW (M³/SEC) .0175 plus
.009
.026
0.92 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 650

Considerable old growth Douglas fir in this part of the basin
Total habitat: 3500 plus 5100 downstream in R5 = 8600
Pot. smolt yield: 344
Combined E. Robertson total: 984
M+B (Shawnigan Div.) is active in this part of the watershed which features old growth fir of peeler quality and excellent high head logging conditions - one of the last glory holes.

HABITAT FORM Cowichan Co Colonization

46

HABITAT SECTION PLAN VIEW upstream

REACH SUMMARY

AVE CHAN. WIDTH	6 M
AVE WETTED WIDTH	2 M
AVE SLOPE	1 %
LENGTH	2000 M
HABITABLE AREA	4000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

downstream

System Name Meade Cr. Trib 3 Reach No. 2
No. — Extend from N 7.5 Mi's above Point No. ___ of ___
NTS 1dc 92 C/16 Card No. ___ of ___
Site Location old grade King
55 | 9 | 25 Time 1700 Agency ___ Crew TB /
yr mo day
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather clear, warm Air Temp. °C 15
Access Mile from Meade Main via Tributary Water Temp. °C 9

SECTION SUMMARY

Avg. Chan. Width (m)	6	Total Pool (%)	32
Avg. Wetted Width (m)	2	Total Riffle (%)	43
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	100	Total Glide (%)	25
Avg. Slope (%)	1	Total Slough (%)	
Debris (%)	10	Turbidity (cm)	

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	40	20	20	10	5	
riffle	2	20	40	20	10	8	
run							
glide	5	40	20	20	15		
slough							

D50 (cm) 2 D90 (cm) 30

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 6
WETTED WIDTH (M) .2
AVE. DEPTH (CM) 7
WETTED X-SEC. AREA (M²) .014
AVE VELOCITY (M/SEC) .15
FLOW (M³/SEC) 0.0021

0.074 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

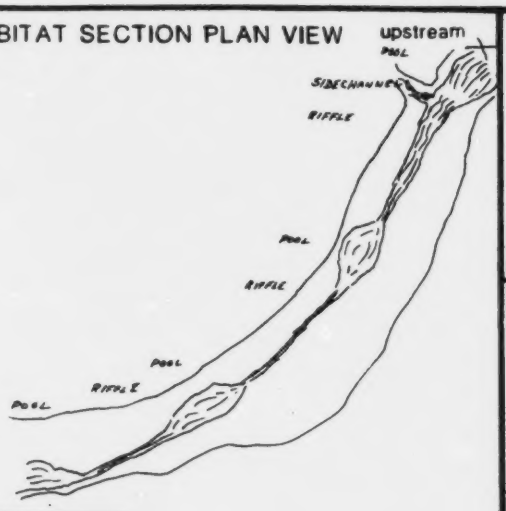
ELEV ≅ 700

Total habitat : 4000 m²
Pot. smolt yield : 320

HABITAT FORM COWICHAN Co COLONIZATION

47

HABITAT SECTION PLAN VIEW



HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

AVE. CHAN. WIDTH	7.5 M
AVE. WETTED WIDTH	1.5 M
AVE. SLOPE	2 %
LENGTH	2600 M
HABITABLE AREA	3900 M²

System Name Dalso (Devil's Club) Cr. Reach No. 2
No. 92 - 4800 (NIP) Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location 1250 m above falls
95 | 8 | 24 (yr mo day) Time 1400 Agency ___ Crew TB /
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear & warm Air Temp. °C 24
Access Water Cowichan from Forest Main 614 1.5 km to Forest Boundary Water Temp. °C 11.5

SECTION SUMMARY

Avg. Chan. Width (m)	7.5	Total Pool (%)	45
Avg. Wetted Width (m)	1.5	Total Riffle (%)	55
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	150	Total Glide (%)	
Avg. Slope (%)	2	Total Slough (%)	
Debris (%)	10	Turbidity (cm)	30+
Side Channel	Nil (L) M H	Compaction	Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	30	40	20	5		
riffle	2	10	30	40	18		
run							
glide							
slough							

D50 (cm) 7 D90 (cm) 32

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 7.5
WETTED WIDTH (M) 0.8
AVE. DEPTH (CM) 10
WETTED X-SEC. AREA (M²) 0.08
AVE VELOCITY (M/SEC) .33
FLOW (M³/SEC) 0.0264
0.93 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 105

ADVANCED SECOND GROWTH (EARLY MATURE)
FIR - HEMLOCK
SALMONBERRY - SWORDFERN
DEVILS CLUB - ALDER

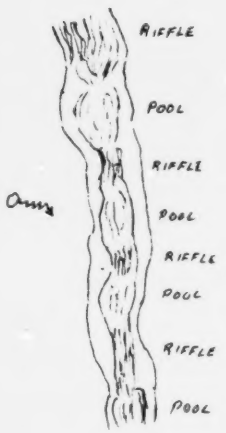
COMMENTS

Ct pair density : 0.12
R1 dries early (may 20 - July 10) except for one deep plunge pool below the falls at 700 M.
available R3 habitat : 3900 M2
Quality : fair to good
Probable smolt yield @ 1 fry / M² and 8 % survival: 312

HABITAT FORM Cowichan Co Colonization

48

HABITAT SECTION PLAN VIEW upstream



HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

AVE. CHAN. WIDTH	5m
AVE. WETTED WIDTH	2 m
AVE. SLOPE	4 %
LENGTH	3500 m
HABITABLE AREA	7000 m²

downstream

System Name Koksilah Reach No. 2
No. 92-4800-020-575 Point No. ___ of ___
NTS 92B/12 Card No. ___ of ___
Site Location 50 M above last bridge
95 | 9 | 6 (yr mo day) Time ___ Agency ___ Crew TB/
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Cloudy; mild Air Temp. °C 17
Access Cowichan-Sahtlam Rd Water Temp. °C 10

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	42
Avg. Wetted Width (m)	2	Total Riffle (%)	58
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	100	Total Glide (%)	
Avg. Slope (%)	4	Total Slough (%)	
Debris (%)	10	Turbidity (cm)	14+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	2	30	50	10	8	Tr	
riffle	1	30	50	11	8	Tr	
run							
glide							
slough							

D50 (cm) 5 D90 (cm) 30

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) .2
AVE. DEPTH (CM) 6
WETTED X-SEC. AREA (M^2) .012
AVE VELOCITY (M/SEC) .5
FLOW (M^3/SEC) .006
.21 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

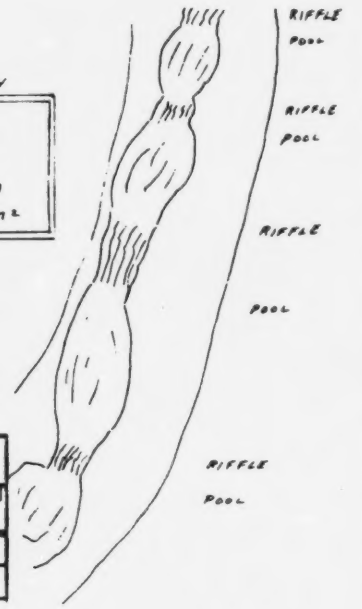
ELEV ≅ 325

Trout density: 0
Neither are trout evident below the falls. Why? The stream is too small for St and Ct are sparse in the Upper Koksilah system.

HABITAT FORM COWICHAN CO COLONIZATION

HABITAT SECTION PLAN VIEW

upstream



downstream

REACH SUMMARY

ACW	9M
AWW	5M
AS	3%
L	1200 M
HA	6000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Widow Cr Reach No. 1
No. 92-4900-750-250 Point No. of
NTS 92 C/16 Card No. of
Site Location First bridge 1K above confluence W Cottonwood
85 | 8 | 27 Time 1300 Agency Crew TB/
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + warm Air Temp. °C 20
Access Widow Main Water Temp. °C 10.5

SECTION SUMMARY

Avg. Chan. Width (m)	9	Total Pool (%)	70
Avg. Wetted Width (m)	5	Total Riffle (%)	30
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	500	Total Glide (%)	
Avg. Slope (%)	3	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	50+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	2	7	15	50	26		
riffle	1	3	5	30	61		
run							
glide							
slough							

D50 (cm) 15 D90 (cm) 1100

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 9
WETTED WIDTH (M) 1.5
AVE. DEPTH (CM) 31
WETTED X-SEC. AREA (M²) 0.46
AVE VELOCITY (M/SEC) 0.25
FLOW (M³/SEC) 0.116
4.10 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≈ 310

COMMENTS

Trout density : 0.05 / M²
Gradient increases sharply above this point.
Total RI habitat : 6000 M
Habitat Quality : fair
Pot. smolt yield : 240
This stream is best suited for St
Cottonwood St are spawning run and very immature - unable to muster enough strength to leap the falls. Earlier run fish would pass the falls easily and utilize Upper Cottonwood and lower Widow. Some late run St may navigate Cottonwood Falls in favorable years like 1969 when meltwater provided high flows during migration.

HABITAT FORM Coho/Chan Cc Colonization

50

HABITAT SECTION PLAN VIEW

upstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW 7 M
AWW 3 M
AS 5 %
L 1500 M
HA 4500 M2

PLUS 1100 M2 OF RES. AT .5 FRY / M2

downstream

System Name Richardson Reach No. 5
No. 92-4800-600 Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location 60m above reservoir
85 | 9 | 25 (yr mo day) Time 1300 Agency ___ Crew TB / ___
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x ___ y coordinates
Weather Clear, warm Air Temp. °C 17
Access walk up from NW Water Temp. °C 5

SECTION SUMMARY

Avg. Chan. Width (m)	7	Total Pool (%)	70
Avg. Wetted Width (m)	3	Total Riffle (%)	30
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	300	Total Glide (%)	
Avg. Slope (%)	5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	35+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	10	10	10	60	5	
riffle	1	5	10	10	70	4	
run							
glide							
slough							

D50 (cm) 20 D90 (cm) 200

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 7
WETTED WIDTH (M) .6
AVE. DEPTH (CM) 18
WETTED X-SEC. AREA (M²) .108
AVE VELOCITY (M/SEC) .40
FLOW (M³/SEC) 0.043
1.52 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 220

COMMENTS

Trout density : 0.03

Reservoir area : ≅ 1125 M²

Spillway 1.3 m wide with 1.6 m vertical drop to sloping bedrock. Reservoir spills all year; its "honeymoon Bay" water supply.

Total habitat 4500 @ .5 fry / M² = 180 smolts
1100 @ .5 fry / M² = 44 smolts

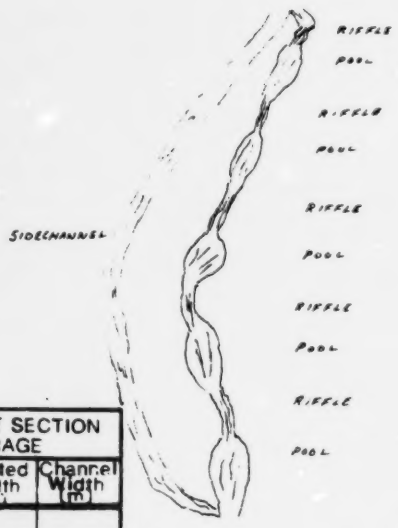
Pot. smolt yield : 224

Note. Good smolt trapping site at reservoir spillway.

HABITAT FORM COWICHAN CO COLONIZATION

51

HABITAT SECTION PLAN VIEW upstream



HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW	4m
AWW	2m
AS	0.5 %
L	1500 m
HA	3000 m²

downstream

System Name Glover (Hatchery) Cr. Reach No. 1
No. — Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location 50 M Above Youbou Rd.
85 | 9 | 19 (yr mo day) Time 1200 Agency ___ Crew TB/
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Partly cloudy; cool Air Temp. °C 16
Access Youbou Rd., mill access rd. Water Temp. °C 10

SECTION SUMMARY

Avg. Chan. Width (m)	4	Total Pool (%)	62
Avg. Wetted Width (m)	2	Total Riffle (%)	38
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	100	Total Glide (%)	
Avg. Slope (%)	0.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	20+

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	30	40	20	Tr		
riffle	5	20	30	20	25		
run							
glide							
slough							

D50 (cm) 5 D90 (cm) 25

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 1
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 6
WETTED X-SEC. AREA (M²) ___
AVE VELOCITY (M/SEC) .30
FLOW (M³/SEC) .018
0.63 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≈ 202

COMMENTS

Trout density (Bt and Ct) : .05 / M²

Available habitat : 3000 M²

Co density below barrier : 2 / M² (the barrier is the Youbou Rd. culvert).

Potential smolt yield at 9 % fry - smolt survival : 240

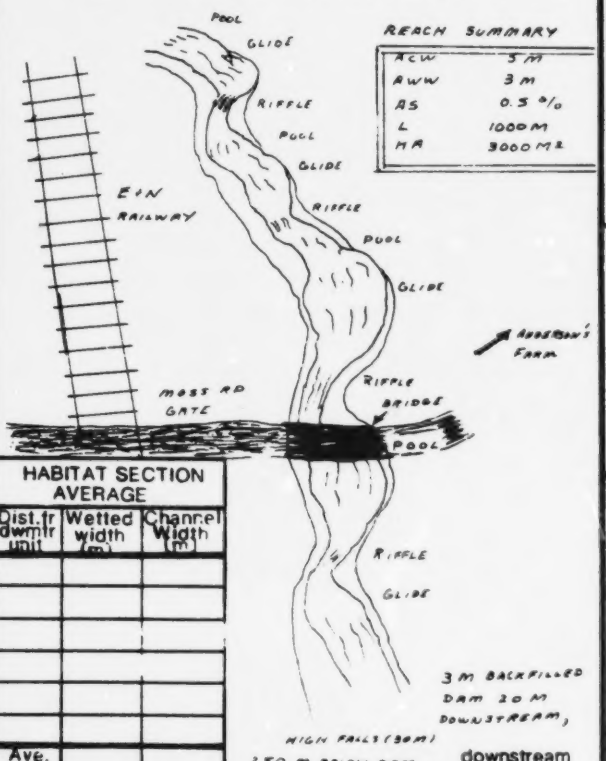
This is an exceptional stream; very stable with almost ideal structure for Co, Ct and Bt. Early fish culturists recognized its value and located a hatchery on it. The facility operated from 1910 to 1933.

The Fish and Wildlife Branch will oppose Co enhancement in this stream because it is the most important brown trout spawning - early rearing creek in the Cowichan system.

HABITAT FORM COWICHAN Co COLONISATION

52

HABITAT SECTION PLAN VIEW upstream



REACH SUMMARY

ACW	5 M
AWW	3 M
AS	0.5 %
L	1000 M
MA	3000 M2

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Petrolas Reach No. 3
No. 92-4800-020-110 Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location Moss Rd. (Dave Anderson's Bridge)
85 | 9 | 13 Time 1400 Agency ___ Crew TB /
yr mo day
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Cloudy, cool, showers Air Temp. °C 16
Access Lakeside Rd - Moss Rd Water Temp. °C 11.5

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	44
Avg. Wetted Width (m)	3	Total Riffle (%)	20
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	300	Total Glide (%)	46
Avg. Slope (%)	0.5	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	20+

Side Channel Nil (L) M H Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	80	10	9	1			
riffle	60	20	10	10			
run							
glide	80	10	9	1			
slough							

D50 (cm) .2 D90 (cm) 5

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 8
WETTED X-SEC. AREA (m^2) .08
AVE VELOCITY (M/SEC) .66
FLOW (m^3/SEC) .053
1.86 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV = 43

EQUISETUM - WATER PARSLEY - CANARY GRASS - LADY FERN - SALMONBERRY - ARUM (WET WOODLAND ECOTYPE)

COMMENTS

Apparently excellent Co habitat
Trout density: 0. Cutthroats are present in this reach but very rare.
Signs of eutrophication; particularly below falls.
Intensive agricultural use of Upper Basin (R4). R4 is a mud ditch. It is wetted but has no flow. R3 discharge is groundwater seepage. There is heavy catchment and storage in R4 which gradually percolates thru organics and fines for release in R3.
Total R3 habitat: 3000 m2
R1 summer Co density: 2/m2

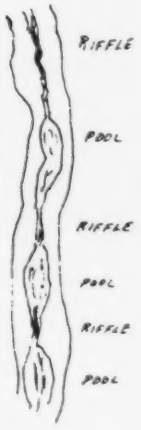
Expected R3 smolt yield: 240
Note: The property owner is very touchy. His name is Dave Anderson. Contact him before entry.

HABITAT FORM Cowichan Co Colonization

53

HABITAT SECTION PLAN VIEW

upstream



REACH SUMMARY

A CW	8
A WW	3
A S	4.6
L	1500 M
N A	4500 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

downstream

System Name West Koksilah (R1) Reach No. 1
No. 92-4800-020-GTO-150 Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location Canyon below forks confluence
85 | 9 | 7 yr mo day Time ___ Agency ___ Crew TB/
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear, mild Air Temp. °C ___
Access Alive (BCAD) out to R (Rt 2) then down roads into canyon Water Temp. °C 9

SECTION SUMMARY

Avg. Chan. Width (m)	8	Total Pool (%)	50
Avg. Wetted Width (m)	3	Total Riffle (%)	50
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	150	Total Glide (%)	
Avg. Slope (%)	4.6	Total Slough (%)	
Debris (%)	0	Turbidity (cm)	

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool							
riffle							
run							
glide							
slough							

D50 (cm) ___ D90 (cm) ___

FLOW SUMMARY

METHOD CALCULATED BY ADDING
CHAN. WIDTH (M) DISCHARGES OF THE
WETTED WIDTH (M) TWO CONTRIBUTING
AVE. DEPTH (CM) FLOWS - SECTION
WETTED X-SEC. AREA (M²) IS INACCESSIBLE
AVE VELOCITY (M/SEC) BUT OBSERVABLE FROM SLOPES
FLOW (M³/SEC) .024
.85 cfs

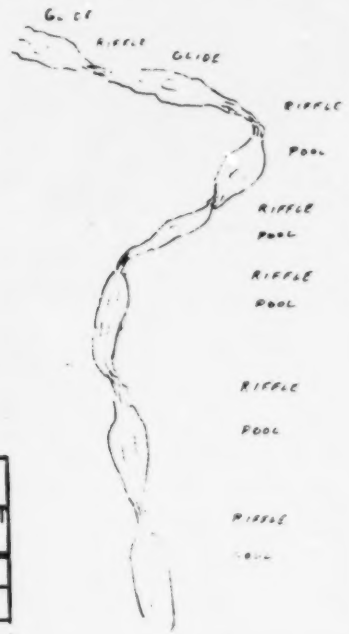
COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

Very marginal Co habitat due to slope and turbulence.
Prime parr plus SF rearing water

HABITAT SECTION PLAN VIEW

upstream



downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW	3.5m
AWW	1.5 m
AS	1 %
L	1300 m
WA	3250 m2

System Name: Quamichan Creek — Reach No. 2
No. 92-4900-055 — Point No. ___ of ___
NTS 92 B/13 — Card No. ___ of ___
Site Location
85 | 9 | 5 yr mo day — Time 1200 — Agency ___ — Crew TB / 19
Field Photo Init. ___ — Field Photo & Roll No.
Air Photo Location No. ___ — Flight line ___ — photo nos. ___ — x y coordinates
Weather Cloudy; cold — Air Temp. °C ___
Access Townsite Rd — Water Temp. °C 14 (Stream) 7.8 (Lake)

SECTION SUMMARY

Avg. Chan. Width (m)	3.5	Total Pool (%)	46
Avg. Wetted Width (m)	1.5	Total Riffle (%)	31
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	150	Total Glide (%)	23
Avg. Slope (%)	1	Total Slough (%)	
Debris (%)	1	Turbidity (cm)	

Side Channel (Nil) L M H — Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr	C
pool	10	20	30	30	10	Tr	
riffle	5	20	30	30	15	Tr	
run							
glide	10	20	30	30	10	Tr	
slough							

D50 (cm) 1 — D90 (cm) 8

FLOW SUMMARY

METHOD: FLOAT
CHAN. WIDTH (M): 3.5
WETTED WIDTH (M): .1
AVE. DEPTH (CM): 2
WETTED X-SEC. AREA (M^2): .0002
AVE VELOCITY (M/SEC): .03
FLOW (M^3/SEC): 0.000063
0.002 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≈ 22

COMMENTS

Quamichan Creek is intermittant in terms of Co rearing value although there is usually some flow between pools, it seems too little to support Co. (Total habitat: 3250 / Pot. smolt yield: 180)

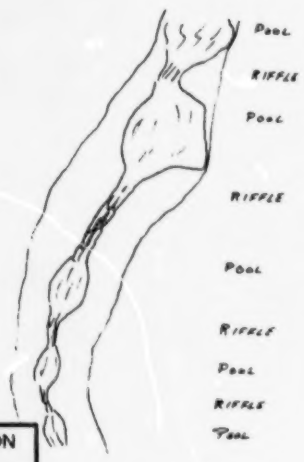
Quamichan Lake cutthroats spawn in the creek and some fry remain over the summer; likely stranded

Quamichan L. (310 H) is the most outstanding potential Co rearing area in the system. This enriched, mermictic lake is capable of producing at least 248 000 Co smolts.

The lake supports a good early spring sport fishery but very few people participate despite good success and large size (43 cm plus).

HABITAT FORM Cowichan Co Colonization

HABITAT SECTION PLAN VIEW upstream



downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

AV CH W 10M
AV W W 4M
AV SL 4 %
L 1000 M
WA 4000 M²

System Name Upper Nixon Reach No. 3
No. 92-4800-900 Point No. ___ of ___
NTS 92 C/16 Card No. ___ of ___
Site Location 200 M above falls
85 | 9 | 26 (yr mo day) Time 1300 Agency ___ Crew TB /
Field Photo Init. Field Photo & Roll No
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear, cool Air Temp. °C 14
Access Old grade from summit of Cogswell Mtn Water Temp. °C 6

SECTION SUMMARY

Avg. Chan. Width (m)	10	Total Pool (%)	57
Avg. Wetted Width (m)	4	Total Riffle (%)	43
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	200	Total Glide (%)	
Avg. Slope (%)	4	Total Slough (%)	
Debris (%)	30	Turbidity (cm)	30+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	10	20	30	32	3	
riffle	2	5	10	30	40	13	
run							
glide							
slough							

D50 (cm) 20 D90 (cm) 150

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 10
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 13
WETTED X-SEC. AREA (m^2) .13
AVE VELOCITY (M/SEC) .33
FLOW (m^3/SEC) 0.043
1.51 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 430

COMMENTS

Slopes are very moist in places - considerable seepage visible most area streams, many small steep tributaries flow all summer. The West Slope of VI is very close.

Total habitat: 4000 m²
Pot. small spwnd: 160

Nixon W trib (R3) 4000 m²/160
Nixon E trib 2000 m²/ 80

HABITAT FORM

56

HABITAT SECTION PLAN VIEW upstream

downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW	6 M
AWW	2 M
RS	45 %
L	2800 M
HA	4000 M2

System Name NIXON W Trib Reach No. 2
No. 92 - 4801 - 701 Point No. ___ of ___
NTS 92C/16 Card No. ___ of ___
Site Location 2K above falls
85 | 9 | 26 yr mo day Time ___ Agency ___ Crew TB /
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Partly cloudy, mild Air Temp. °C 16
Access 4th from Cayoosh N Water Temp. °C 9

SECTION SUMMARY

Avg. Chan. Width (m)	6	Total Pool (%)	50
Avg. Wetted Width (m)	2	Total Riffle (%)	50
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m^2)	200	Total Glide (%)	
Avg. Slope (%)	45	Total Slough (%)	
Debris (%)	3	Turbidity (cm)	184

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	3	20	30	30	17		
riffle	1	20	30	32	17		
run							
glide							
slough							

D50 (cm) 15 D90 (cm) 25

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 6
WETTED WIDTH (M) DATA IS
AVE. DEPTH (CM) MISSING
WETTED X-SEC. AREA (M^2) .
AVE VELOCITY (M/SEC)
FLOW (M^3/SEC) 0.042
1.48 cfs

COMMENTS

Marginal CO habitat

STREAM CROSS-SECTION (Looking Downstream)

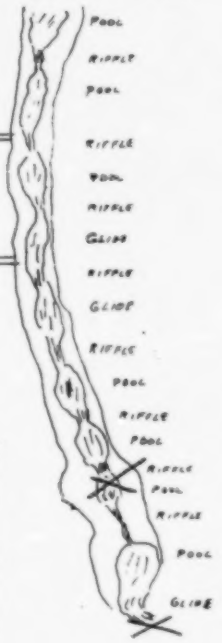
ELEV = 340

HABITAT FORM COWICHAN Co COLONIZATION

57

HABITAT SECTION PLAN VIEW

upstream



downstream

REACH SUMMARY

ACW	5
AWW	2
AS	4.5
L	1500 M
HA	3000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name South Sutton W. Fork Reach No. 3
No. — S. Sutton unless Sutton 6.5 R's Point No. ___ of ___
NTS above the lake 92 C/16 Card No. ___ of ___
Site Location 1000 M above falls
75 | 9 | 26 Time 1600 Agency ___ Crew TB /
yr mo day
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear, warm Air Temp. °C 16
Access Hike from Sutton Main Water Temp. °C 8

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	50
Avg. Wetted Width (m)	2	Total Riffle (%)	30
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	200	Total Glide (%)	20
Avg. Slope (%)	4.5	Total Slough (%)	
Debris (%)	25	Turbidity (cm)	22 +

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	20	20	30	20	Tr	
riffle	3	10	10	30	47	Tr	
run							
glide	10	20	20	30	20	Tr	
slough							

D50 (cm) 20 D90 (cm) 90

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 8
WETTED X-SEC. AREA (M²) .09
AVE VELOCITY (M/SEC) 1
FLOW (M³/SEC) 0.090
2.82 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 320

COMMENTS

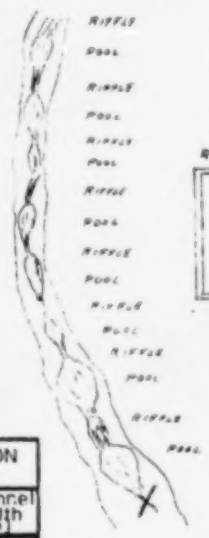
Steep, moist adjacent slopes. Numerous small slope failures have contributed many alders in whole and parts. This is a dank, dark valley well suited for mushrooms and mould.

Total habitat: 3000 M²
Pot smolt Yield: 120
E. Fork too steep

HABITAT FORM COWICHAN CR COLONIZATION

58

HABITAT SECTION PLAN VIEW upstream



REACH SUMMARY

ACW	5 M
RWW	2.5 M
AS	3
L	1000 M
WA	2500 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

downstream

System Name Fish Cabin Creek (W FK.) Reach No. 2
No. — Sutton Trib. 8.5 Km upstream Point No. ___ of ___
NTS 92 C/16 of the lake Card No. ___ of ___
Site Location 100 m above falls
85 | 9 | 26 Time 1400 Agency ___ Crew TD /
yr mo day
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear, warm Air Temp. °C 16
Access Ride from Sutton Main Water Temp. °C 9

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	55
Avg. Wetted Width (m)	2.5	Total Riffle (%)	45
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	250	Total Glide (%)	
Avg. Slope (%)	3	Total Slough (%)	
Debris (%)	30	Turbidity (cm)	

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	20	20	30	20	10		
riffle	10	10	30	40	10		
run							
glide							
slough							

D50 (cm) 10 D90 (cm) 50

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) .5
AVE. DEPTH (CM) 7
WETTED X-SEC. AREA (m^2) .035
AVE VELOCITY (M/SEC) .0175
FLOW (m^3/SEC) .0035 plus 0.021
0.74 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ± 200

COMMENTS

Many CT fry and parr population below falls. Most moved in when the Co left early this month.

Steep; most slopes with fine textured soils; heavy debris from old logging - low flushing and stream velocities.
Total habitat 2500 m² (in two units)

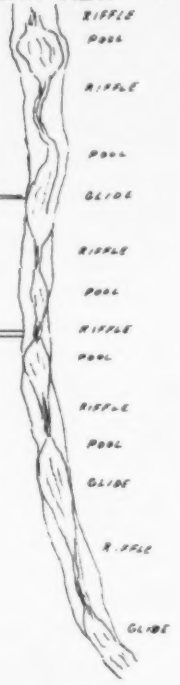
Pot. smolt yield 100

NOTE: This system is extremely sensitive to logging

HABITAT FORM

HABITAT SECTION PLAN VIEW

upstream



REACH SUMMARY

ACW	2
AWW	1
AS	1
L	1500
HA	1500 m²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

downstream

System Name Bradnell Cr. Reach No. 3
No. — Point No. ___ of ___
NTS 92 c/16 Card No. ___ of ___
Site Location above Yukon Rd. (1200 m)
85 | 9 | 26 (yr mo day) Time 1300 Agency ___ Crew TB / ___
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear & warm Air Temp. °C 25
Access Yukon Rd. Water Temp. °C 11.5

SECTION SUMMARY

Avg. Chan. Width (m)	2	Total Pool (%)	42
Avg. Wetted Width (m)	1	Total Riffle (%)	33
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	100	Total Glide (%)	25
Avg. Slope (%)	1	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	101

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	30	40	10	10		
riffle	5	20	40	15	20		
run							
glide	10	30	40	10	10		
slough							

D50 (cm) 5 D90 (cm) 30

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 2
WETTED WIDTH (M) .1
AVE. DEPTH (CM) 3
WETTED X-SEC. AREA (m^2) .003
AVE VELOCITY (M/SEC) .15
FLOW (m^3/SEC) .00045
.016 cfs

COMMENTS

STREAM CROSS-SECTION
(Looking Downstream)

ELEV ≈ 200

Bradnell Creek is very stable in terms of flow and temperature.
Trout density (CY): 0

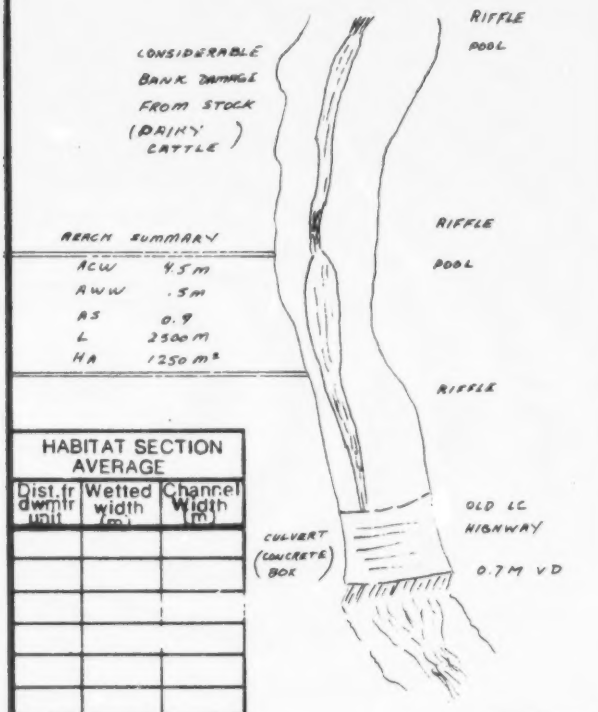
Trout are present in this reach. Fry density is about 0.5 / m^2 in June and early July. Resident adults (12 - 16 cm) spawn in the area in February. However, during low flow periods, fry and parr disappear; probably migrating upstream to some well-covered pools. But many are lost to drying and predators.

Upper Bradnell Cr. appears too small to support Co fry but according to Neave, 1949; the stream yielded an average of 6000 Co smolts between 1938 and 1946. Most were likely produced in the lower 600 m which are now out of production due to extreme alteration (concrete flume). There are 1500 m^2 of habitat remaining which is possibly capable of yielding 120 smolts

HABITAT FORM COWICHAN Co COLONIZATION

60

HABITAT SECTION PLAN VIEW



HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Bings Creek (E Branch) Reach No. 1
No. 92-4500-046-650 Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location 0-100 m above Old LC Highway
85 | 8 | 20 Time 1300 Agency ___ Crew TB 1
yr mo day
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Partly cloudy Air Temp. °C 23
Access Old LC Highway Water Temp. °C 14

SECTION SUMMARY

Avg. Chan. Width (m)	4.5	Total Pool (%)	75
Avg. Wetted Width (m)	0.5	Total Riffle (%)	25
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	50	Total Glide (%)	
Avg. Slope (%)	0.9	Total Slough (%)	
Debris (%)	2	Turbidity (cm)	5

Side Channel (Nil) L M H Compaction Nil L M (H)

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	20	30	40	10			
riffle	10	40	40	10			
run							
glide							
slough							

D50 (cm) 1 D90 (cm) 8

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 4.5
WETTED WIDTH (M) .4
AVE. DEPTH (CM) 2
WETTED X-SEC. AREA (M^2) .008
AVE VELOCITY (M/SEC) .25
FLOW (M^3/SEC) .002
.071 cfs

STREAM CROSS-SECTION (Looking Downstream)

COMMENTS

Water somewhat turbid due to fines and heavy diatom cover (in suspension), a few CT fry, no parr or larger fish. Parr numerous below culvert at higher flow stages.

This branch of Bings Cr. originates (in summer) from groundwater seepage at a point some 1500 m above Old Lake Cowichan Rd.

Total habitat: 1250 m²

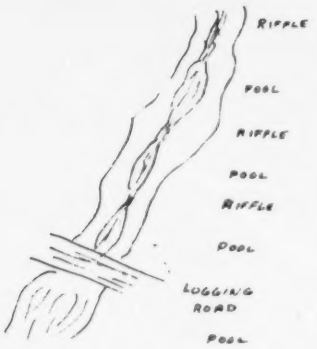
Below falls summer Co density: 3/m²

Potential smolt yield: 100

HABITAT FORM

61

HABITAT SECTION PLAN VIEW upstream



1973 PHOTO

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW	6 m
AWW	2 m
AS	2.5
L	1000 m
HA	3500 m²

downstream

System Name Little Shaw Reach No. 3
No. Point No. of
NTS 92 C/16 Card No. of
Site Location
72 | 8 | 15 yr mo day Time 1300 Agency Crew TB /
Field Photo Init. Field Photo & Roll No
Air Photo Location No. flight line photo nos. x y coordinates
Weather Clear + warm Air Temp. °C 19
Access Pac. Fir Logging Little Shaw Main Water Temp. °C 9

SECTION SUMMARY

Avg. Chan. Width (m)	6	Total Pool (%)	60
Avg. Wetted Width (m)	2	Total Riffle (%)	40
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	100	Total Glide (%)	
Avg. Slope (%)	2.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	35+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	10	20	30	40			
riffle	5	20	35	40			
run							
glide							
slough							

D50 (cm) 10 D90 (cm) 40

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 6
WETTED WIDTH (M) 2
AVE. DEPTH (CM) 14
WETTED X-SEC. AREA (m^2) .28
AVE VELOCITY (M/SEC)
FLOW (m^3/SEC) .046
1.6 cfs

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

INTERPRETED FROM A 1973 PHOTO (WHEN THE AREA WAS NEW SLASH)

13 YEAR OLD FIR PLANTATION

ELEV ≅ 710

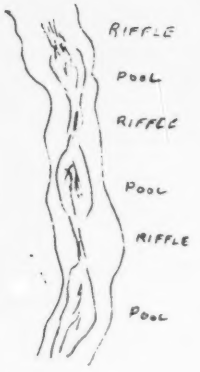
An isolated reach, no longer accessible by road. Separated from low gradient habitat and cowichan lake by 3500 m of high gradient.

HABITAT FORM Cowichan Co Col

62

HABITAT SECTION PLAN VIEW

upstream



downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW	6.7 m
AWW	2 m
AS	4.0 %
L	500 m
HA	1000 m²

System Name Wild River (R1) Reach No. 1
No. 92-4500-020-423 Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location ___
85 | 9 | 6 Time ___ Agency ___ Crew TB 1
yr mo day
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear - warm Air Temp. °C 15
Access BCEP Valley Main Water Temp. °C 10

SECTION SUMMARY

Avg. Chan. Width (m)	6.7	Total Pool (%)	80
Avg. Wetted Width (m)	2	Total Riffle (%)	30
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	100	Total Glide (%)	
Avg. Slope (%)	4.0	Total Slough (%)	
Debris (%)	1.0	Turbidity (cm)	

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	3	20	40	20	10		
riffle	2	20	40	20	17		
run							
glide							
slough							

D50 (cm) 3 D90 (cm) 40

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 6.7
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 7
WETTED X-SEC. AREA (M²) .1
AVE VELOCITY (M/SEC)
FLOW (M³/SEC) .035
1.24 cfs.

COMMENTS

STREAM CROSS-SECTION (Looking Downstream)

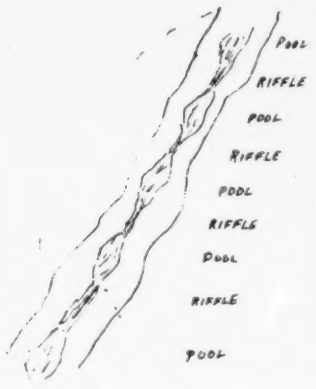
ELEV ≅ 150

Poor Co habitat, good rearr plus 5% water

HABITAT FORM Cowichan Co Colonization

63

HABITAT SECTION PLAN VIEW upstream



HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW	7M
AWW	4M
AS	3%
L	500M
HA	2000 M²

downstream

System Name Nixon East Reach No. 2
No. Point No. ___ of ___
NTS 92C/6 Card No. ___ of ___
Site Location
85 | 6 | 21 yr mo day Time ___ Agency ___ Crew TB /
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Partly cloudy Air Temp. °C 18
Access Wade Nixon ; hike Water Temp. °C 10

SECTION SUMMARY

Avg. Chan. Width (m)	7	Total Pool (%)	57
Avg. Wetted Width (m)	4	Total Riffle (%)	43
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	400	Total Glide (%)	
Avg. Slope (%)	3	Total Slough (%)	
Debris (%)	10	Turbidity (cm)	25+

Side Channel Nil (L) M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	5	15	20	40	20		
riffle	2	15	20	43	20		
run							
glide							
slough							

D50 (cm) 20 D90 (cm) 35

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 7
WETTED WIDTH (M) .4
AVE. DEPTH (CM) .1
WETTED X-SEC. AREA (M²) .04
AVE VELOCITY (M/SEC) 1
FLOW (M³/SEC) .04
1.4 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV ≅ 270

COMMENTS

Stream reached by wading Nixon.
Obstructions:
1. @ 50M – a 2R3 cascade
2. then 1.5R3 just up-stream
3. a small chute just above
4. a 2M culvert at an old grade xing 150 m above Nixon – below this point the stream is constricted (5(3)127R)

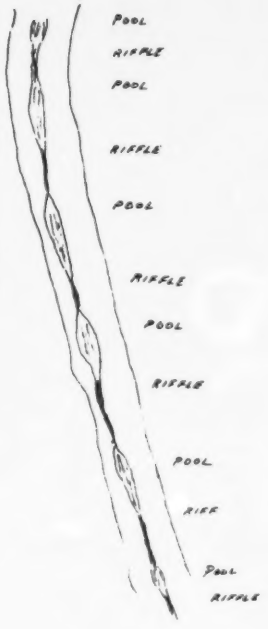
Marginal Co habitat ; too small for good ST production

HABITAT FORM COWICHAN Co COLONIZATION

64

HABITAT SECTION PLAN VIEW

upstream



downstream

REACH SUMMARY

ACW	2.5 M
AWW	1 M
AS	0.6
L	1000 M
HA	1000 M²

HABITAT SECTION AVERAGE

Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name SHUTZ Creek West Reach No. 1
No. considered a branch of SHUTZ E Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location above CN culvert
95 | 8 | 21 yr mo day Time 1400 Agency ___ Crew TB /
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Partly cloudy, mild Air Temp. °C 25
Access Park from Shutz Falls Rd. Water Temp. °C 12

SECTION SUMMARY

Avg. Chan. Width (m)	2.5	Total Pool (%)	63
Avg. Wetted Width (m)	1	Total Riffle (%)	37
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	100	Total Glide (%)	
Avg. Slope (%)	0.7	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	10

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	30	30	20	20	Tr		
riffle	2	5	20	50	23		
run							
glide							
slough							

D50 (cm) 2 D90 (cm) 11

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 2.5
WETTED WIDTH (M) 0.4
AVE. DEPTH (CM) 5
WETTED X-SEC. AREA (M²) .02
AVE VELOCITY (M/SEC) .33
FLOW (M³/SEC) .0066
0.23 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV. ≡ 140

COMMENTS

St. cam is slightly discoloured and smells like septic tanks arent working well. There is a small community at SHUTZ Falls which includes a few hobby farms.

No trout seen.

No coho below obstruction where there is one large pool.

8/22 Trout density : 0.02 /M²
(Ct pass)

Total habitat : 1000 M²
Potential yield based on .1 Fry / M² and 8 % winter survival : 80 smolts

HABITAT FORM COWICHAN

64

HABITAT SECTION PLAN VIEW

upstream

downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name Skutz Creek West Reach No. 1
No. 92-4900-390 Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location 50 M below Skutz Falls Rd
85 | 8 | 21 yr mo day Time 1430 Agency ___ Crew TB /
Field Photo Init. Field Photo & Roll No
Air Photo Location No. ___ flight line ___ photo nos. x y coordinates
Weather Partly cloudy, mild Air Temp. °C 24
Access Path from Skutz Falls Rd. Water Temp. °C 9

SECTION SUMMARY

Avg. Chan. Width (m)	2.5	Total Pool (%)	50
Avg. Wetted Width (m)	1	Total Riffle (%)	50
Total Length (m)	50	Total Run (%)	
Total Wetted Area (m²)	50	Total Glide (%)	
Avg. Slope (%)	0.5	Total Slough (%)	
Debris (%)	10	Turbidity (cm)	10+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	30	30	35	5	Tr		
riffle	2	5	60	33	Tr		
run							
glide							
slough							

D50 (cm) 2 D90 (cm) 15

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 2.5
WETTED WIDTH (M) .6
AVE. DEPTH (CM) 5
WETTED X-SEC. AREA (m^2) .03
AVE VELOCITY (M/SEC) .25
FLOW (m^3/SEC) .0075
0.26 cfs

STREAM CROSS-SECTION (Looking Downstream)

COMMENTS

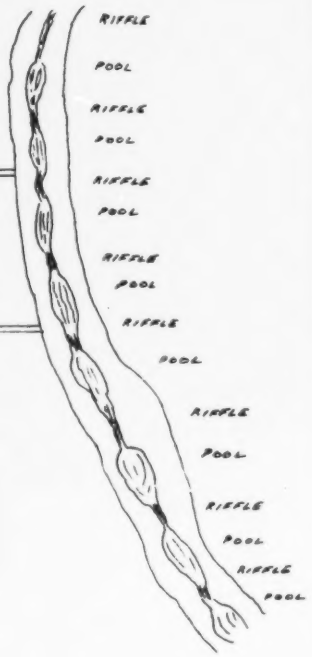
Stream flow originates 200 M above Skutz Falls Rd.
Total available habitat above obstruction : 1000 M^2
Skutz 2 is likely too small for CO
Possible smolt yield : 80
F+W Br. attempted to backflood culverts pool for Bt access by installing a cross-log at the bottom end of the pool. It hasn't worked so far.

HABITAT FORM COWICHAN Co COLONIZATION

65

HABITAT SECTION PLAN VIEW

upstream



downstream

REACH SUMMARY

ACW	3.5 M
AWW	1.5 M
AS	0.4 %
L	530 M
HA	800 M2

HABITAT SECTION AVERAGE

Dist. from unit	Wetted width (m)	Channel Width (m)
Ave. (m)		

System Name SKUTZ Cr. West Reach No. 1
No. 92-4900-390 Point No. ___ of ___
NTS 92 B/13 Card No. ___ of ___
Site Location 700 M above OBST.
85 | 8 | 21 yr mo day Time 1300 Agency ___ Crew TB/
Field Photo Init. Field Photo & Roll No.
Air Photo Location No. flight line photo nos. x y coordinates
Weather Partly cloudy, mild Air Temp. °C 24
Access Bushwack from Mayo Rd. Water Temp. °C 8.5

SECTION SUMMARY

Avg. Chan. Width (m)	3.5	Total Pool (%)	58
Avg. Wetted Width (m)	1.5	Total Riffle (%)	42
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	150	Total Glide (%)	
Avg. Slope (%)	0.4	Total Slough (%)	
Debris (%)	60	Turbidity (cm)	15+

Side Channel Nil (L) M H Compaction Nil L (M) H

WETTED BED MATERIAL (%)

	F 0-2 (mm.)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	30	50	20	Tr			
riffle	15	30	55	Tr			
run							
glide							
slough							

D50 (cm) 2 D90 (cm) 8

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 3.5
WETTED WIDTH (M) 1
AVE. DEPTH (CM) 9
WETTED X-SEC. AREA (M²) .09
AVE VELOCITY (M/SEC) .25
FLOW (M³/SEC) 0.0225

0.79 cfs

STREAM CROSS-SECTION (Looking Downstream)

ELEV: ≅ 145

COMMENTS

Note: For the last 3 years, 200 Co fry salvaged from drying side-channels near SKUTZ Falls have been released to a pool in SKUTZ West None have survived thru the summer. Probable reason: stream size. Too narrow and shallow to accomodate Co after they become territorial.

Summer flow originates from groundwater seepage 800 M above obstruction which is 0 - 17 M from the confluence with the Cowichan. Total available habitat: ≅ 900 M².

Ct density 0.0 Trout are present in this stream in small numbers but are well hidden during extreme low flows.

This stream is proably too small for Co.

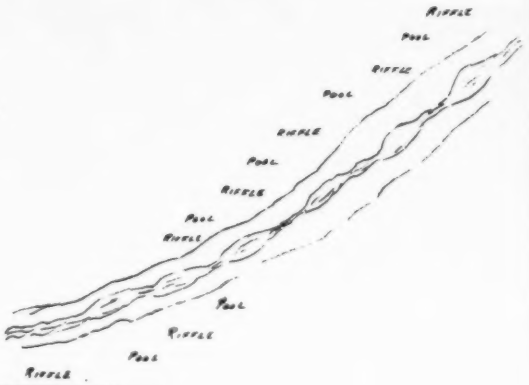
Although there are slight differences in channel form, slope and substrate between the upper and lower portion of this stream, the entire length above the obstruction is considered one reach.

Pot. smolt yield: 64

HABITAT FORM COWICHAN Co COLONIZATION

66

HABITAT SECTION PLAN VIEW upstream



downstream

HABITAT SECTION AVERAGE		
Dist. fr dwnstr xsect (m)	Wetted width (m)	Channel Width (m)
Ave. (m)		

REACH SUMMARY

ACW	5 M
AWW	1.5 M
PS	1.5 %
L	1000 M
HA	1500 M²

System Name West Kok Br. 1 Reach No. 2
No. 92-4500-020-670-150 Point No. ___ of ___
NTS 92 B/12 Card No. ___ of ___
Site Location above A main (10 m)
85 | 9 | 7 yr mo day Time 1300 Agency ___ Crew TB /
Field Photo Init. ___ Field Photo & Roll No. ___
Air Photo Location No. ___ flight line ___ photo nos. ___ x y coordinates
Weather Clear, cool Air Temp. °C 15
Access Bushwack from A Water Temp. °C 7

SECTION SUMMARY

Avg. Chan. Width (m)	5	Total Pool (%)	50
Avg. Wetted Width (m)	1.5	Total Riffle (%)	50
Total Length (m)	100	Total Run (%)	
Total Wetted Area (m²)	150	Total Glide (%)	
Avg. Slope (%)	1.5	Total Slough (%)	
Debris (%)	5	Turbidity (cm)	15+

Side Channel (Nil) L M H Compaction Nil (L) M H

WETTED BED MATERIAL (%)

	F 0-2 (mm)	S.Gr. 2-16 (mm)	L.Gr. 16-64 (mm)	Cob. 64-256 (mm)	Boul. >256 (mm)	Bedr.	C
pool	2	10	20	20	45	3	
riffle	1	5	10	30	45	9	
run							
glide							
slough							

D50 (cm) 7 D90 (cm) 30

FLOW SUMMARY

METHOD FLOAT
CHAN. WIDTH (M) 5
WETTED WIDTH (M) .3
AVE. DEPTH (CM) 8
WETTED X-SEC. AREA (m²) .024
AVE VELOCITY (M/SEC) .33
FLOW (m³/SEC) 0.0079
.25 cfs

COMMENTS

STREAM CROSS-SECTION
(Looking Downstream)

ELEV: ≅ 530

Marginal summer Co habitat. The stream is shallow and turbulent; lacking slow pools and glides. Nil winter capability.

≅ 1500 m² is the max. amount available.

High falls (12 m, 10 m) below R2. Both lack plunge pools. Smolt mortality could be significant. Much higher falls (40 m) on main West Fork 900 m below confluence.

Available habitat: 1500 m²

Pot. smolt yield: 60

This stream might be too small for Co.

APPENDIX B

Table of Discharge Estimates and Temperature Measurements for the Locations Surveyed in August - September, 1985

APPENDIX B: 1985 COWICHAN SYSTEM DISCHARGE AND TEMPERATURES

DATE	STREAM	LOCATION	DISCHARGE (M^3/sec)	Temp. (C°)
August 9, 1985	Bings	Phillips Road	0.026	15
	Averill	E&N Culvert	0.0022	19
	Beaver	South Shore Road	0.007	19
August 11, 1985	Meade T1	50 m above main	0.050	9
	Meade T2	50 m above main	0.0014	14
	Meade T3	50 m above main	0.005	12.5
	Meade	at old bridge	0.28	12
	Meade (lower)	400 m above Youbou Road		15.5
August 13, 1985	Marguarite Creek	Shaw Main	0.036	13
	Shaw	1700 m above falls	0.50	11
	Shaw (middle)	100 m below E. Fk.	0.22	14
	Shaw (east)	50 m above M. Fk.	0.033	15
	Middle Fork (upper)	2500 m above E. Fk.	0.0066	13
August 14, 1985	West Shaw	1500 m above confluence	0.28	11
	West Shaw (upper)	1200 m above R1	0.05	11
	Shaw (lower)	1800 m below N.S. Road	0.54	15
	McKay (lower)	250 m above mouth	0.18	14
August 15, 1985	Cottonwood	1500 m above N.S. Road	0.30	13
	Lomas	50 m above confluence	0.04	11
	Cottonwood	Upper Bridge	0.112	12.5
	Cottonwood (lower)	Old Grade Crossing	0.40	16
August 19, 1985	McKay (east fork)	Mainline	0.06	14
	McKay	50 m above east McKay	0.06	13.5
	McKay (upper)	50 m below east McKay	0.12	13.5
August 20, 1985	Currie	Paldi	0	-
	Currie	Powerline	0	-
	Bings	10 m above old LC Road	0.002	14
	Menzies	Charlie Dougan's Trail off Sahtlam Road	0.023	9
	Currie-Inwood	Menzies Road	0.000025	15
	Hillcrest Creek	Chamber's Store	0	-
	West Menzies	Old LC Road	0	-
	Inwood	Above Hwy. 18 (50 m)	0*	12
August 21, 1985	Wake Creek	Barnjum Road	0	-
	Skutz 1	700 m above confluence	0.022	8.5
	Skutz 2	5 m above CN culvert	0.023	12
	Skutz 2	10 m below Skutz Falls Road	0.025	9
	Mayo Creek	Skutz Falls Road above lake	0*	15

* Intermittant pools

** No flow but entire stream wetted

APPENDIX B: 1985 COWICHAN SYSTEM DISCHARGE AND TEMPERATURES

DATE	STREAM	LOCATION	DISCHARGE (M^3/sec)	Temp. (C°)
August 22, 1985	Mayo Creek	0-700 m above W RB Road	0*	15
	Dale's Creek	300 m above falls	0.026	11.5
August 24, 1985	March Creek	20 m above east Main	0.0056	15
	East Robertson	1500 m above confluence	0.073	15
	Robertson	1200 M below east Robertson confluence	0.28	15
	Hatchery (Oliver Creek)	Boyd School (Darnell Road)	(15.5 - 7/21)	
August 25, 1985	Easy Creek	160 m above Renfrew Road	0.0023	11.5
	Swampwater Creek	Jct. Lens MN + Renfrew Road	0.0017	12
	Sixteen Creek	20 m above Renfrew Road	0.066	11
	Robertson	50 m above falls	0.084	13
	Robertson (upper)	30 m above Mainline Br.	0.075	11.5
August 26, 1985	Coonskin	30 m above N. Shore Road	0.004	11
	Utility	CN Crossing	0**	14
	Stanley	20 m above Youbou Road	0.00013	13
	Beadnell	100 m above Youbou Road	0.00045	11.5
	Sutton	50 m above Sutton Main	0.35	12.5
	Millar	20 m above Sutton Main	0.026	10.5
	Pastuch	100 m above Robertson confluence	0.024	17
August 27, 1985	Widow	500 m above Cottonwood confluence	0.116	10.5
August 28, 1985	Bear	500 m above falls	0.34	10
August 29, 1985	Holt	At Shawnigan Main (H line)	0.040	11
	Fellows	At M Main	0.052	10
	McPherson	At M Main	0.005	11
August 30, 1985	Mesachie	Forestry Road	0*	12
	Nineteen	Main Bridge	0.212	10.5
	Ashburnham	1500 m above Cowichan Lake	0.026	11
August 31, 1985	Stanley	Greendale Road	0.11	10
	Tiny	Greendale Road	0.0025	9
	Josiah	Old LC Highway	0.013	9.5
September 1, 1985	Koksilah (upper)	2500 m below main crossing	0.023	10
	Old Truck	50 m above upper main	0.002	7
	McPherson (upper)	X Main	0.02	12
	McPherson	100 m below pond	0.01	10
	Tadjiss N	C Main	0.0015	9
	Holt (upper R3)	H Main	0.042	9
	Wild Deer (upper R3)	H Main	0	-

* Intermittant pools

** No flow but entire stream wetted

APPENDIX B: 1985 COWICHAN SYSTEM DISCHARGE AND TEMPERATURES

DATE	STREAM	LOCATION	DISCHARGE (M^3/sec)	Temp. (C°)
September 2, 1985	Fishladder	Indian Road	0.0053	10
September 4, 1985	Richards	Powerline	0.0144	12
	Quamichan	100 m above Tzouhalem Rd. Int. to	0.000063	14
September 6, 1985	Wild Deer	Near Burnt Bridge	0.11	10
	Grant Lake Creek	Mainline (Renfrew Road)	0.06	11.5
	Kapoor	Old Kapoor Camp	.048	10
	Kapoor (upper)	50 m above last bridge	.006	10
September 7, 1985	South Koksilah	Shawnigan-Renfrew Road	0.16	8
	South Koksilah	Near headwaters	.008	6
	E. Branch	500 m below Renfrew Road dry to	0.0001	7
	W. Branch	A Spurs	Int.	
	W. Branch Tributary	A Spurs	Dry	
	West Koksilah			
	Branch 1	A Main	.0079	7
	Branch 2	200 m below A	.017	11
	Branch 2	K Line (M&B)	.006	8
September 9, 1985	Koksilah	Valley Main Bridge	.085	12
	Fellows Creek	50 m above Koksilah confluence	.050	11
	Koksilah	100 m below falls		
		500 m above Fellows Creek	.021	11
September 10, 1985	Kelvin	Cabin footbridge	0.023	11
	Kelvin	1000 m upstream	0.018	11
September 11, 1985	Watercress 1	Logging Road Crossing (Bk51)	0.006	8
	Watercress 2	CN Culvert (Bk51)	0.006	8
September 12, 1985	Kelvin	Koksilah Road	0.053	11
	Petrolas	Moss Road	0.053	11.5
	Petrolas	Heather Bank Road	0**	12
	Heather Bank	Heather Bank Road	.002	8
	Hume	Riverside Road	.003	9
September 15, 1985	Wild Deer	R2	.035	9
	Glenora West	M&B L Line	.00033	11
	Glenora East	M&B L Line	.001	10
	Inwood	Old LC Road	.043	10
September 16, 1985	Glenora (lower) below seepage zone	2000 m above Kelvin confluence	.036	11
September 17, 1985	Slippery	30 m above Sutton confluence	.09	10

* Intermittant pools

** No flow but entire stream wetted

APPENDIX B: 1985 COWICHAN SYSTEM DISCHARGE AND TEMPERATURES

DATE	STREAM	LOCATION	DISCHARGE (M^3/sec)	Temp. (C°)
September 17, 1985	South Sutton	700 m above Sutton confluence	.11	9
	Sutton above S. Sutton	50 m above S. Sutton confluence	.061	9
	Five Culverts Creek	30 m above Sutton Main	.019	9
34.8 mm of rain 9/13 - 9/16. Some streams rose slightly and Beadnell (dry below Youbou Road) and Inwood Creeks started flowing again. Beadnell dried 7/21. Inwood was intermittant above old Lake Cowichan Road by 8/20 but probably reached this condition at least two weeks earlier.				
September 21, 1985	Bear (upper)	M&B's Main	.0003	7
September 22, 1985	Miserable	South Shore Road	.018	8
	Nixon	2000 m above South Shore Road	.225	11
	Raymond	Caycuse main	0.12	10
	Log Dump	South Shore Road	0.013	9
	Junction (Lake Head)	South Shore Road	0.04	9
	Little Shaw	100 m above Shore Road (dry below)	0.046	9
	Shaw	1200 m below North Shore Road	0.75	9
September 24, 1985	Watercress 1	100 m above Cowichan confluence	0.014	8
	Meade Trib. 3 (upper)	R2	0.0021	8
September 25, 1985	Ashburnham	R2 60 m above reservoir	0.043	8
	Ashburnham	R3 50 m above falls	0.007	8
September 26, 1985	Nixon (upper)	R3 200 m above falls	0.043	6
	1st tributary below falls	old grade from Caycuse main	0.006	7
	2nd tributary below falls	old grade from Caycuse main	0.0003	8
	3rd tributary below falls	Caycuse main	0.018	8
	Tributary from E. 1000 m below Raymond	100 m above Nixon confluence	0.046	10
	2nd Nixon Tributary from W.	100 m above Caycuse main	0.042	9
	Five culverts W	100 m above falls	0.021	9
	Five culverts E	100 m above falls	0.002	9
	South Sutton W	200 m above falls	0.080	8
	South Sutton E	200 m above falls	0.030	8
September 29, 1985	Bear Mainstem (upper)	R4 M&B R Line	0.008	7
	East Robertson (upper)	A7 M&B R Line	0.026	11

* Intermittant pools

**No flow but entire stream wetted

APPENDIX C

Reach Descriptions Mapped on N.T.S. 1:50,000 map bases
#92B/12, 92B/13, 92C/9, and 92C/16 (Retained by B. Tutty)